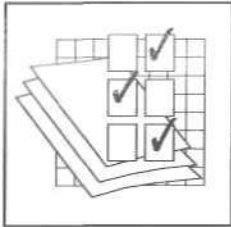


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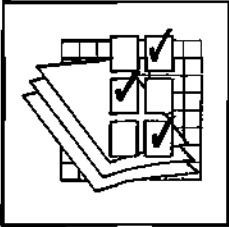
Electronic Design Automation Applications



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CAD/CAM/CAE
Electronic Design Automation Applications
CCAM-EDA-UW-9201
November 30, 1992

Electronic Design Automation Applications



User Wants and Needs

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CAD/CAM/CAE
Electronic Design Automation Applications
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November 30, 1992

Published by Dataquest Incorporated

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Chapter 1

Executive Summary

Introduction and Report Structure

This report is the culmination of Dataquest's research into worldwide electronic design. It can be used by the electronic design automation (EDA) executive to spot significant trends in the target market of design automation tools—namely electronic designers. The report is the analysis of pertinent information for EDA suppliers. The basis for this report is an end-user survey, shown in the Appendix. This survey is also the basis for the Worldwide ASICs User Wants and Needs report, available to subscribers of Dataquest's Worldwide ASIC service. Only those sections of the survey pertaining to electronic design automation were used in this report.

This report proceeds with the following four chapters:

Chapter 2, "Survey Methodology and Demographics," explains the research process employed by Dataquest in gathering the information and the demographics of the respondents of the survey.

Chapter 3, "The Design Process," delves into the actual methodology used in the design of electronic systems, the components of the design group, and the amount of time spent in areas of electronic design. It provides valuable insight into the design cycles of board and ASIC design.

Chapter 4, "The Board Dissected," sheds light upon the rapidly changing face of today's printed circuit boards (PCBs), including characteristics such as signal layers, component types, and demand for advanced packing technologies.

Chapter 5, "EDA Applications Perceptions," gauges current importance rating of design automation tools, as well as analyzes current demand for EDA applications around the world.

Major Findings

The development of electronic systems is being compressed on all sides by market demands. According to electronic designers, there are four factors driving the methodology used and the tools employed in constructing electronic systems—and these are the most important factors to market success: reducing the time to market; reducing the cost; increasing the functionality; and improving the quality and reliability of the electronic system.

Reducing Time to Market

Reducing time to market ranks worldwide as the single most important factor toward market success. The overriding time-to-market pressure is compressing the design cycle to shorter and shorter times, with ASIC and board design cycles anticipated to shrink by 25 to 30 percent during the coming five years. To achieve shorter design cycles, electronic designers will increasingly rely upon top-down design methodologies and design reuse. Indeed, Dataquest research shows that there is a need for 50 percent additional logic synthesis licenses worldwide, from a current installed base of 2.4 licenses per project team. Dataquest believes that design reuse will play an increasingly important role in designer productivity. In 1991, 34 percent of electronic designs were reused portions of previous designs. This percentage should increase with the advent of sophisticated design management and library techniques.

Increasing Functionality

The need to increase the functionality of electronic systems is demanding the use of more sophisticated design tools. According to end users, the number of signal layers upon a printed circuit board is anticipated to grow 47 percent in the next five years. This is driven primarily by North American designers, who on average design more complex electronic systems, based upon ASIC design size and mean number of signal layers per board. Dataquest research indicates that board size will not increase to accommodate the increasing complexity; in fact, it is expected to decrease slightly, as is total IC component count. The extra complexity will be added at the silicon level, and the increased I/O and system speed needs will require new forms of IC package technology. Users have expressed a strong desire to utilize advanced IC packages, including multichip modules, chip-on-board (COB), and tape-automated bonding (TAB).

Reducing the Cost

Reducing the cost of electronic systems consistently ranks as one of the top three factors critical to market success. Reducing the cost while increasing the functionality, and doing this in a shorter amount of time is a difficult design problem. Electronic designers are hoping that decreasing the number of packages per board—in conjunction with increasing the use of test automation tools—will improve overall costs. Designers exhibit a need to increase the number of automatic test-vector generation licenses significantly, and Japanese and European designers rank test-logic synthesis as one of the top five tools in terms of importance.

Improving the Quality and Reliability

Improving the quality and reliability of their systems ranks fourth in the electronic designer's factor's of market success. This rating is driven by the Japanese designers, who perceive this area as being more critical than do their North American and European counterparts. As a market like consumer electronics matures, the need to differentiate products by improving quality and reliability increases.

The renewed interest in consumer electronics will drive all geographic areas to increase their reliance upon EDA tools that improve the manufacturability, quality, and long-term reliability of electronic products.

Dataquest Perspective

Electronic designers are under increasing pressure to create cost-effective, complex systems in shorter amounts of time than ever before. The primary weapon that the project team may wield is the suite of design tools that rest upon the engineer's desk. The first generation of design tools consisted of schematic capture, layout, and simulation tools. These design tools continue to hold high importance value to the electronic designer; but they may be viewed as a replacement market because users do not have a need to increase the number of licenses they currently own. The next generation of tools—consisting of top-down design tools like logic synthesis, hardware description language (HDL)-based entry, mixed-level simulation, and test automation—are beginning to be employed by the mainstream designer. Dataquest believes that the next opportunity for EDA software growth lies in the untapped population of system architects. Indeed, the system definition and partitioning phase of the design consumes 22 percent of the design worldwide; there exist few tools targeted at this area of the design cycle. The ability to design and prototype complex electronic products at the system level, prior to lower-level design optimization, may become a crucial capability in the project team's quest for shorter design cycles.

Chapter 2

Survey Methodology and Demographics —

Dataquest demand-side (or end-user) data is gathered using an extensive survey technique. End users are identified through the registered user and prospect lists of EDA and ASIC companies. Surveys were distributed throughout North America, Europe, and Japan enabling Dataquest to gather a snapshot of electronic design methodology and usage trends. Relying upon Dataquest's international expertise, surveys distributed in Japan were translated into kanji, the Japanese character set to improve the survey's accuracy. A copy of the survey is shown in the Appendix.

Surveys were mailed in the second half of 1991 to North American sites. The responses were then examined for integrity and entered into a database to allow manipulation and cross-cutting of the data. Japanese surveys were distributed at the end of 1991, and the responses were similarly processed and entered early this year. Finally, European surveys were completed last spring.

Respondent Demographics

North America

As shown in Figure 2-1, data collected in North America is predominantly from engineers and engineering managers, with a 16 percent contribution from CAE managers and engineers. Dataquest believes that these data represent a statistically significant sample to gauge the needs and trends of design engineers creating electronic systems.

Figure 2-2 denotes the primary line of business of the respondent's company. Dataquest believes that more significant information may be ascertained by examining the project team's primary line of business, which is shown in Figure 2-3. Dataquest's reasoning is that the design procedures within a given company vary by project team, dependent on the product. For example, a company like Intel may create both semiconductor devices and electronic systems. Only at the project level would the respondent's data be significant.

Respondents to the survey were allowed to check more than one box for their project team's primary line of business. Because of this, certain responses have been classified for more than one application area.

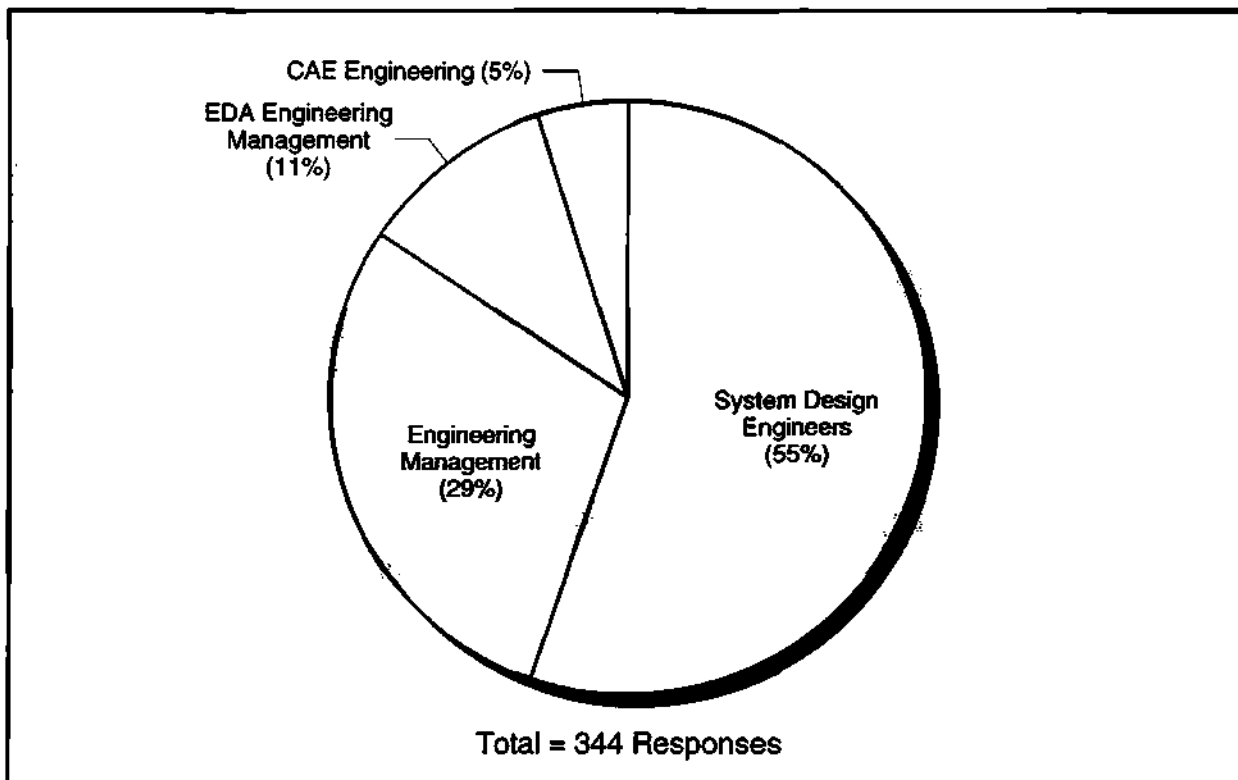
Dataquest received statistically significant responses in North America for the Aerospace/Military Electronics, Data Communication, Telecommunications, and Semiconductor industries. Dataquest is less confident with industry categories that received less than 20 responses. Figure 2-4 shows the distribution of company employee count for North America.

The following gives the total responses and mean employee count of the companies surveyed.

Total Responses: 344

Mean Employee Count of Company: 27,335

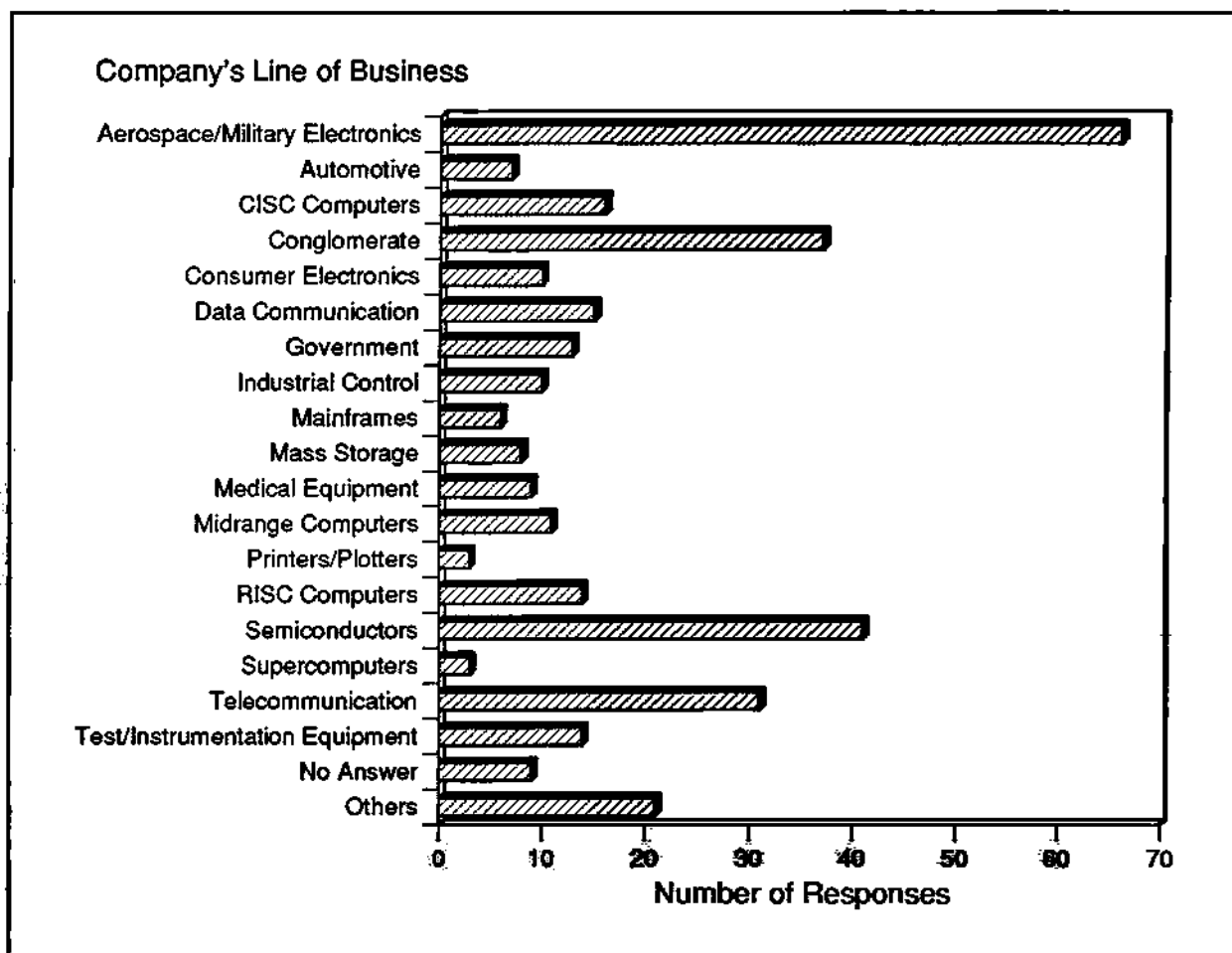
Figure 2-1
North American Respondents, by Job Title



Source: Dataquest (November 1992)

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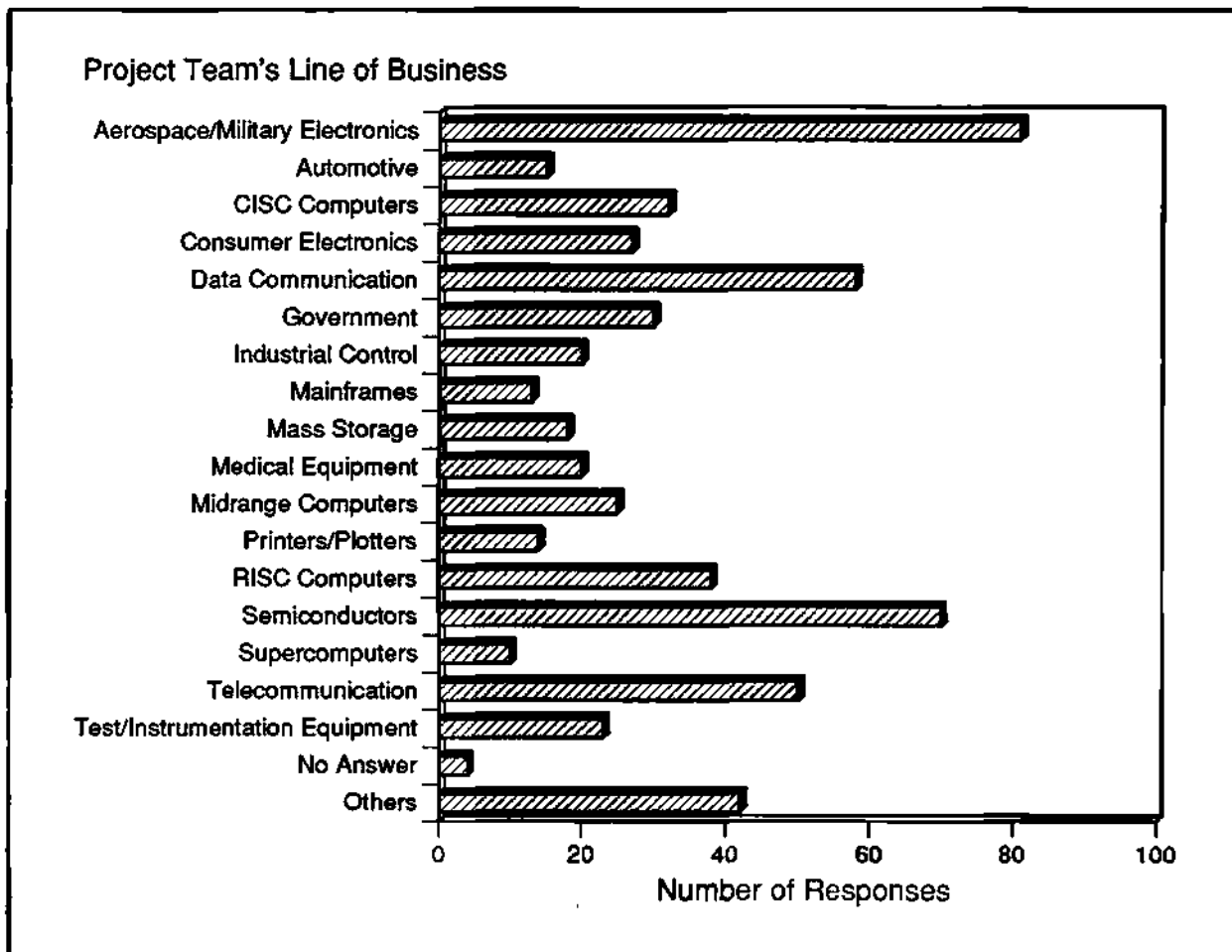
Figure 2-2
North American Respondents' Primary Line of Business



Source: Dataquest (November 1992)

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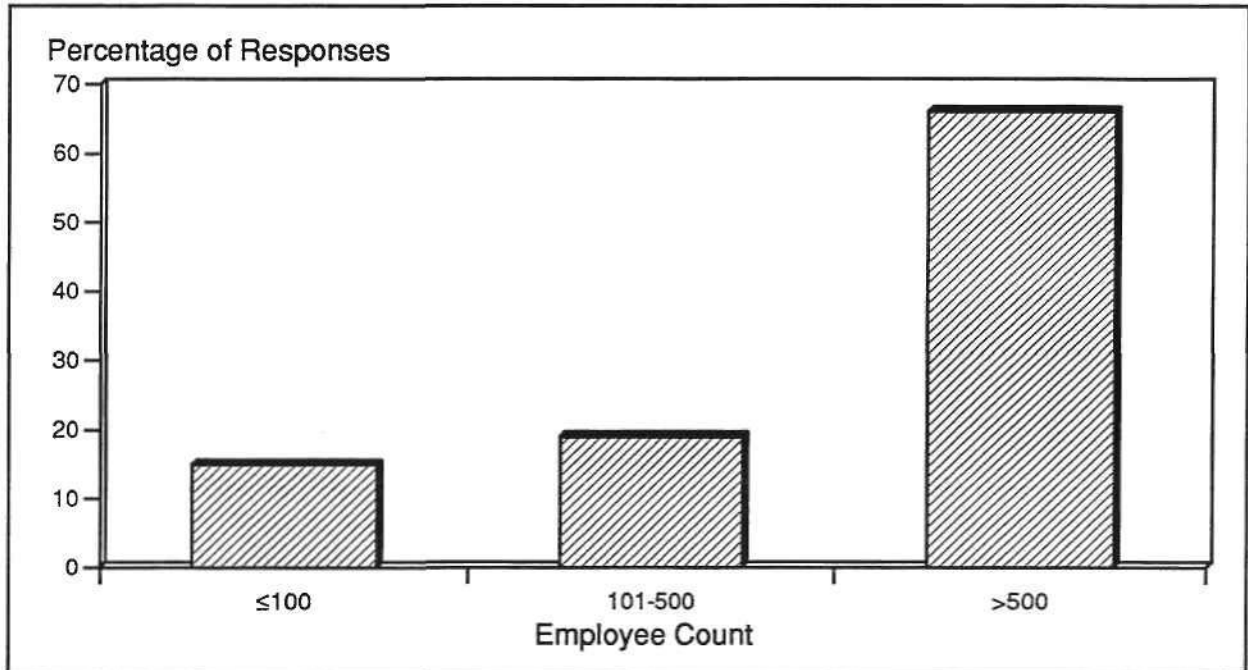
Figure 2-3
North American Respondents' Project Team's Primary Line of Business



Source: Dataquest (November 1992)

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Figure 2-4
North American Distribution of Company Employee Count



Source: Dataquest (November 1992)

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Japan

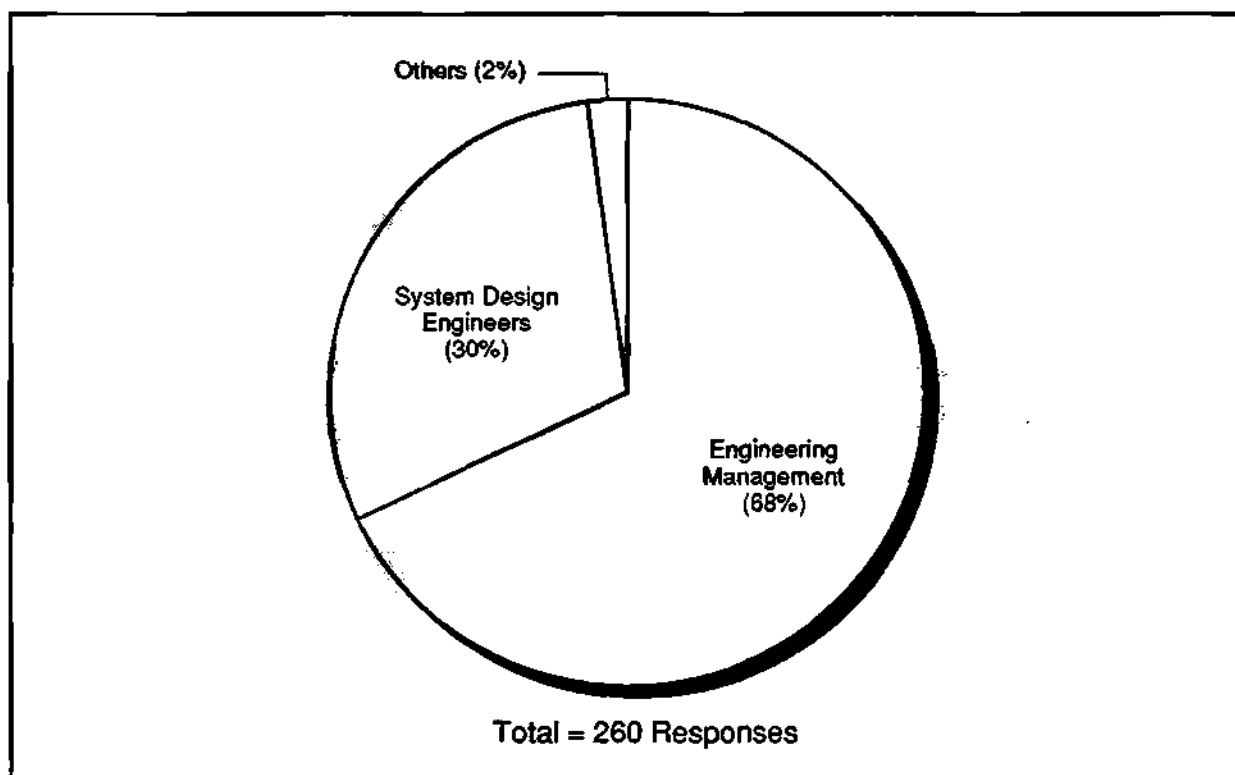
Respondents of Dataquest's survey of Japanese designers are predominantly engineers or engineering managers, as shown in Figure 2-5. Only 2 percent of the respondents were responsible for support of EDA tools. Dataquest received statistically valid samples from the semiconductor and consumer electronics industries, and we are less confident for industries receiving less than 20 responses. Survey results for Japan are shown in Figures 2-5 through 2-8.

The following gives the total responses and mean employee count of the companies surveyed.

Total Responses: 260

Mean Employee Count of Company: 18,560

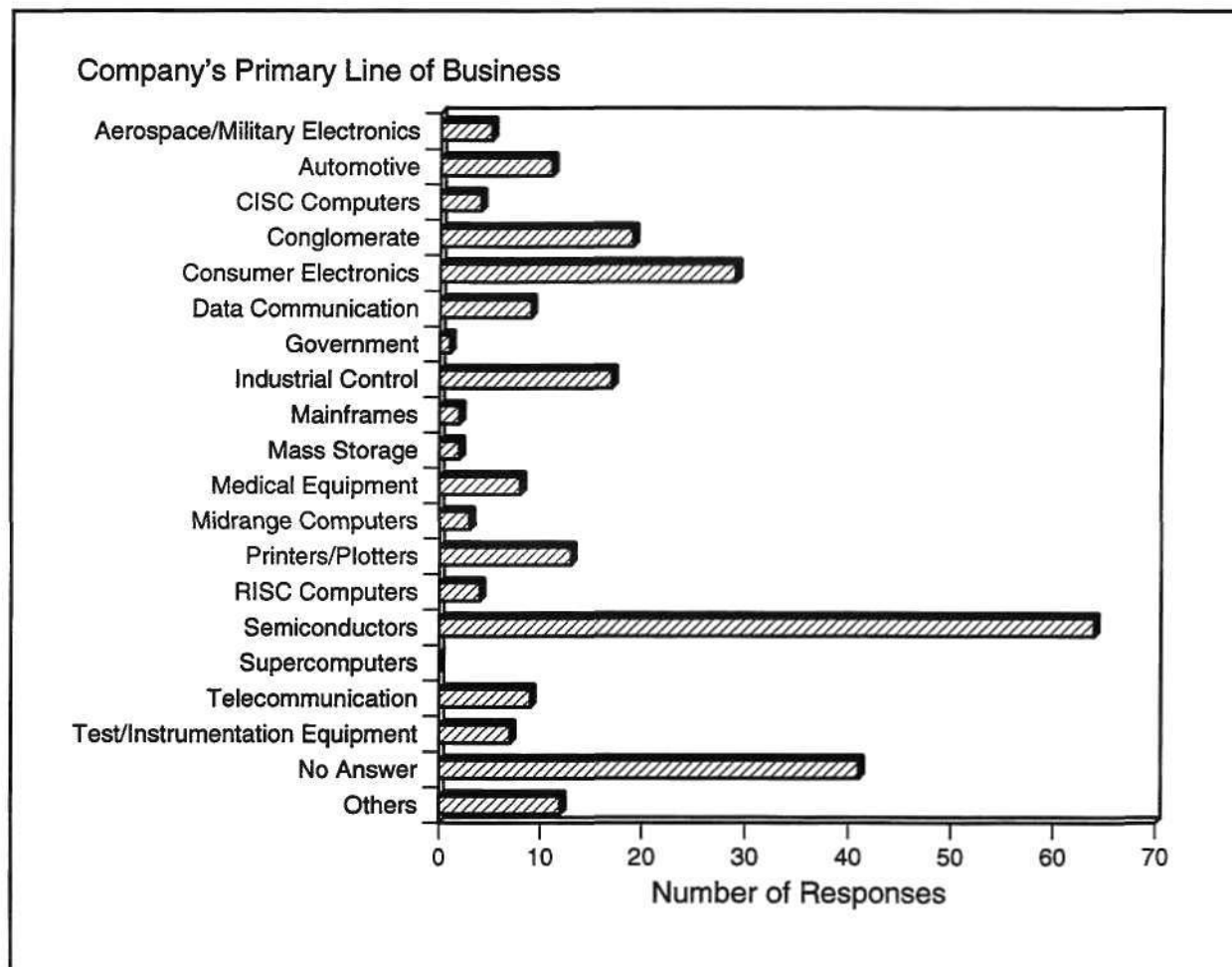
Figure 2-5
Japanese Respondents, by Job Title



Source: Dataquest (November 1992)

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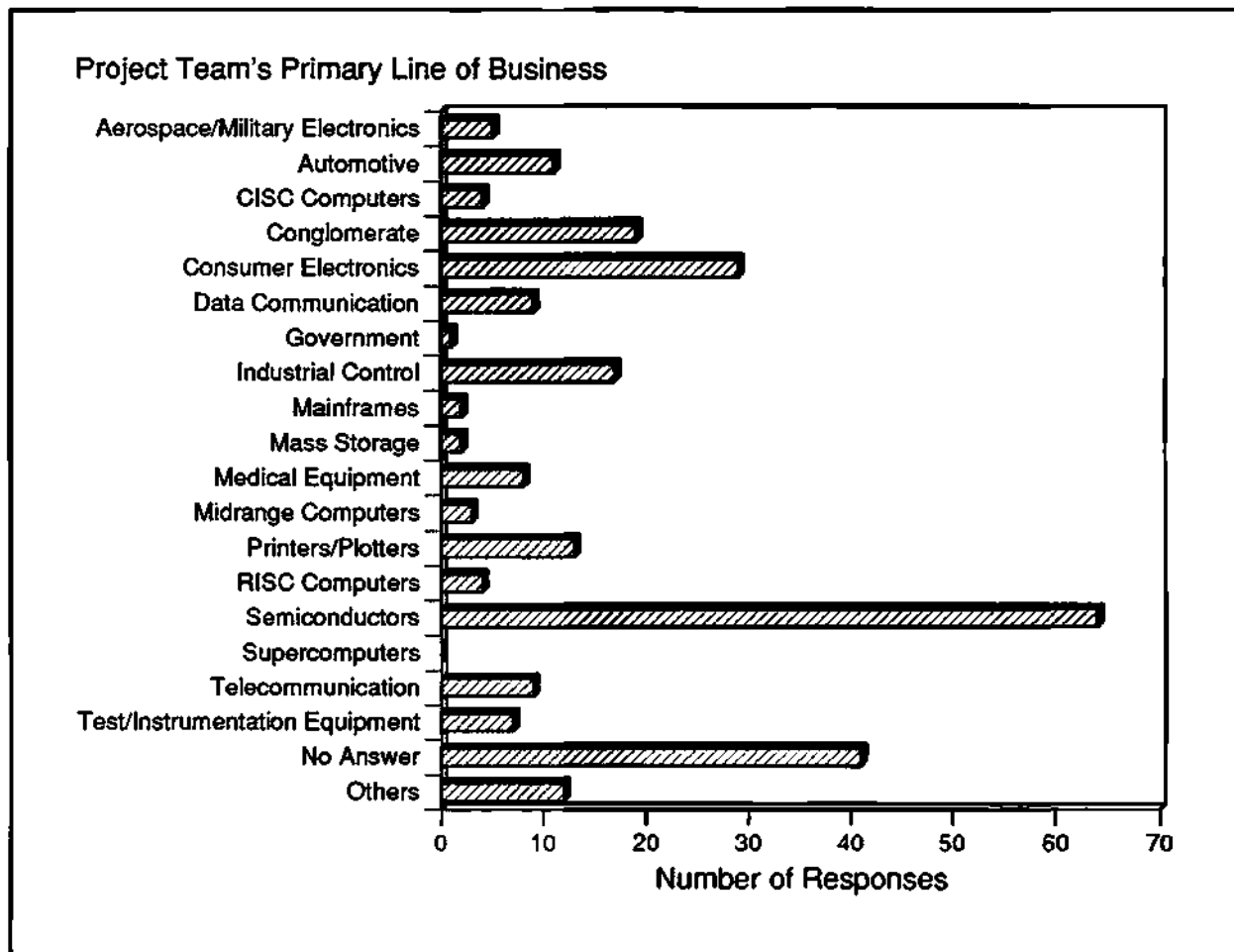
Figure 2-6
Japanese Respondents' Primary Line of Business



Source: Dataquest (November 1992)

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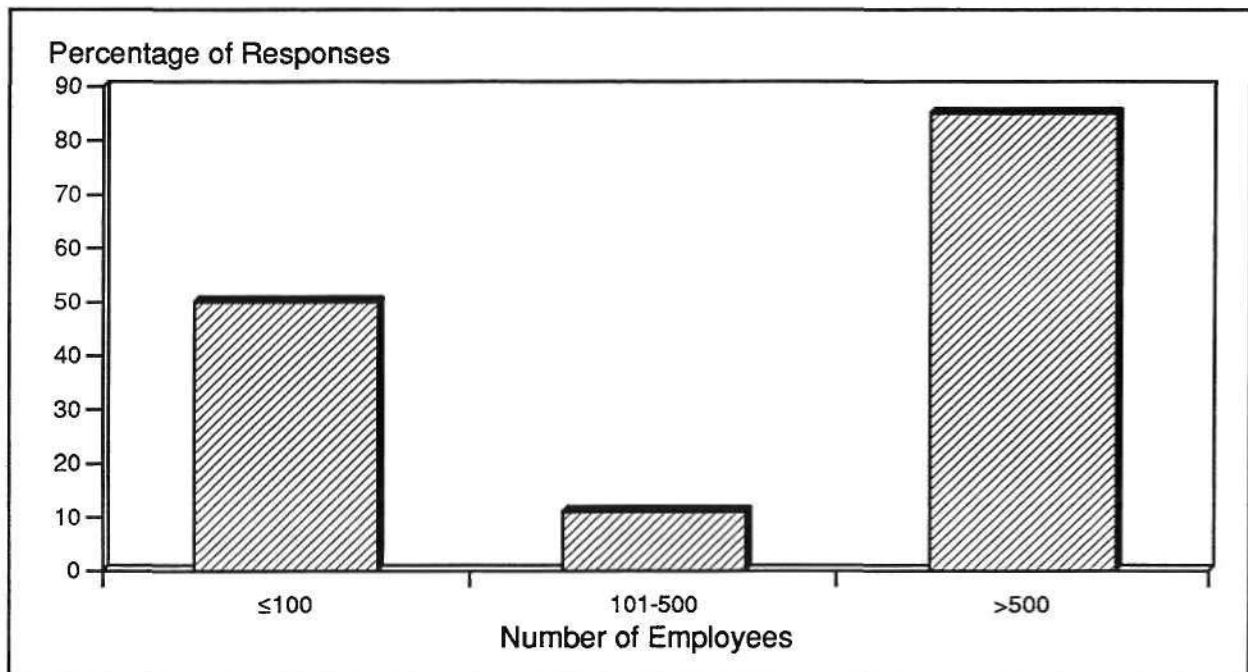
Figure 2-7
Japanese Project Team's Primary Line of Business



Source: Dataquest (November 1992)

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Figure 2-8
Japanese Distribution of Company Employee Count



Source: Dataquest (November 1992)

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Europe

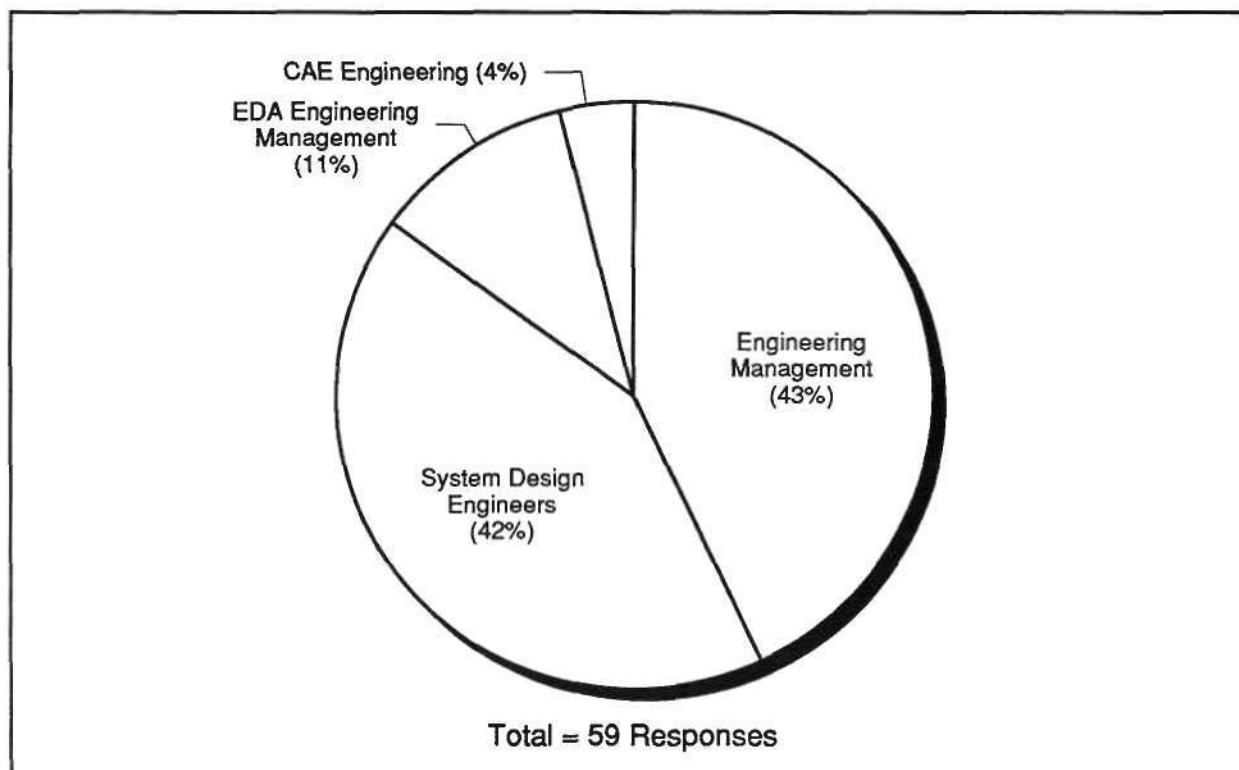
Due to language and inter-country mailing difficulties, Dataquest's results from its survey of European designers were relatively small, with only 59 responses. While no single industry recorded more than 20 responses, Dataquest included the results of European data for completeness. Indeed, the results from Europe are consistent with North American and Japanese data. Demographic information is shown in Figures 2-9 through 2-12.

The following gives the total responses and mean employee count of the companies surveyed.

Total Number of Responses: 59

Mean Employee Count of Company: 18,560

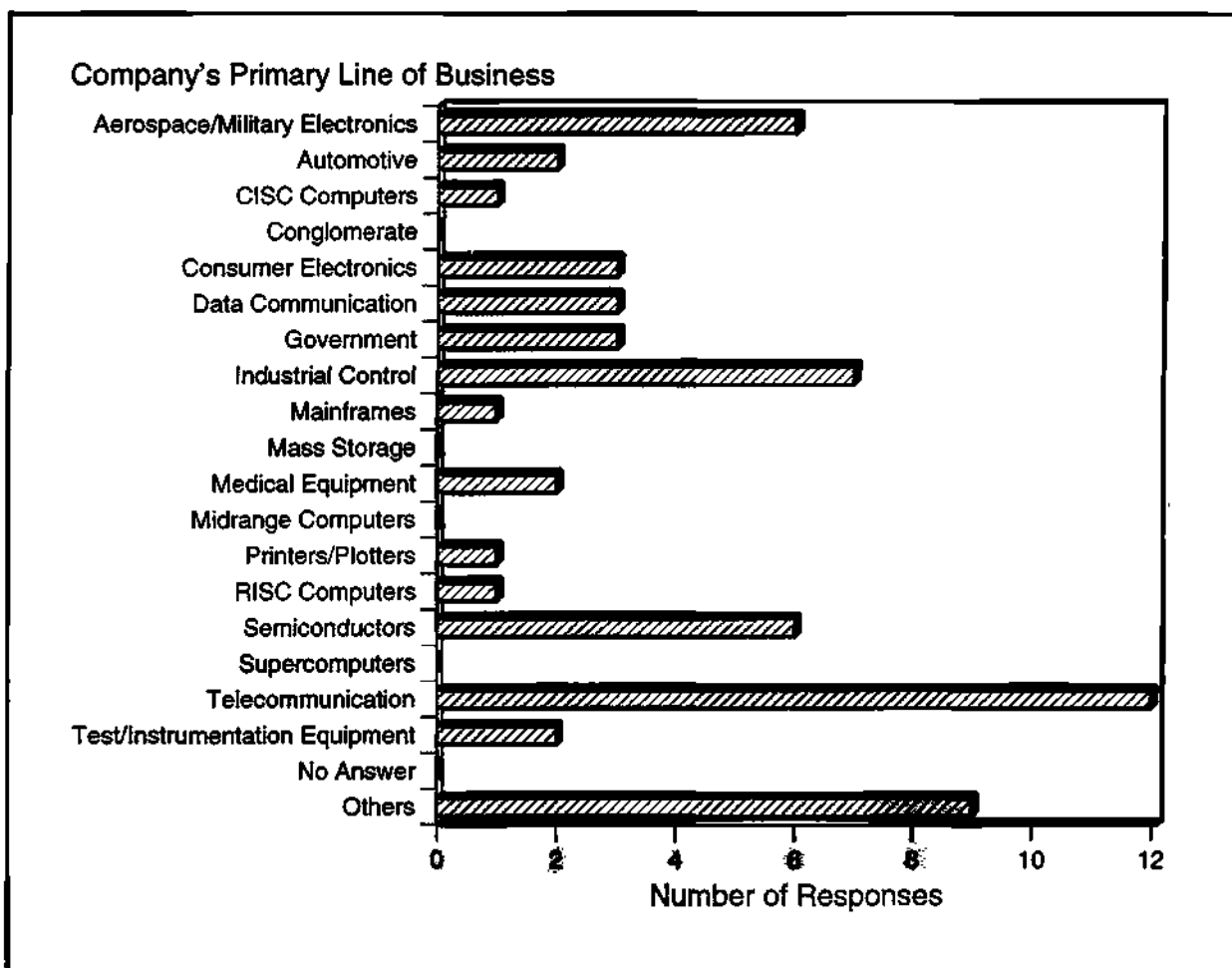
Figure 2-9
European Respondents, by Job Title



Source: Dataquest (November 1992)

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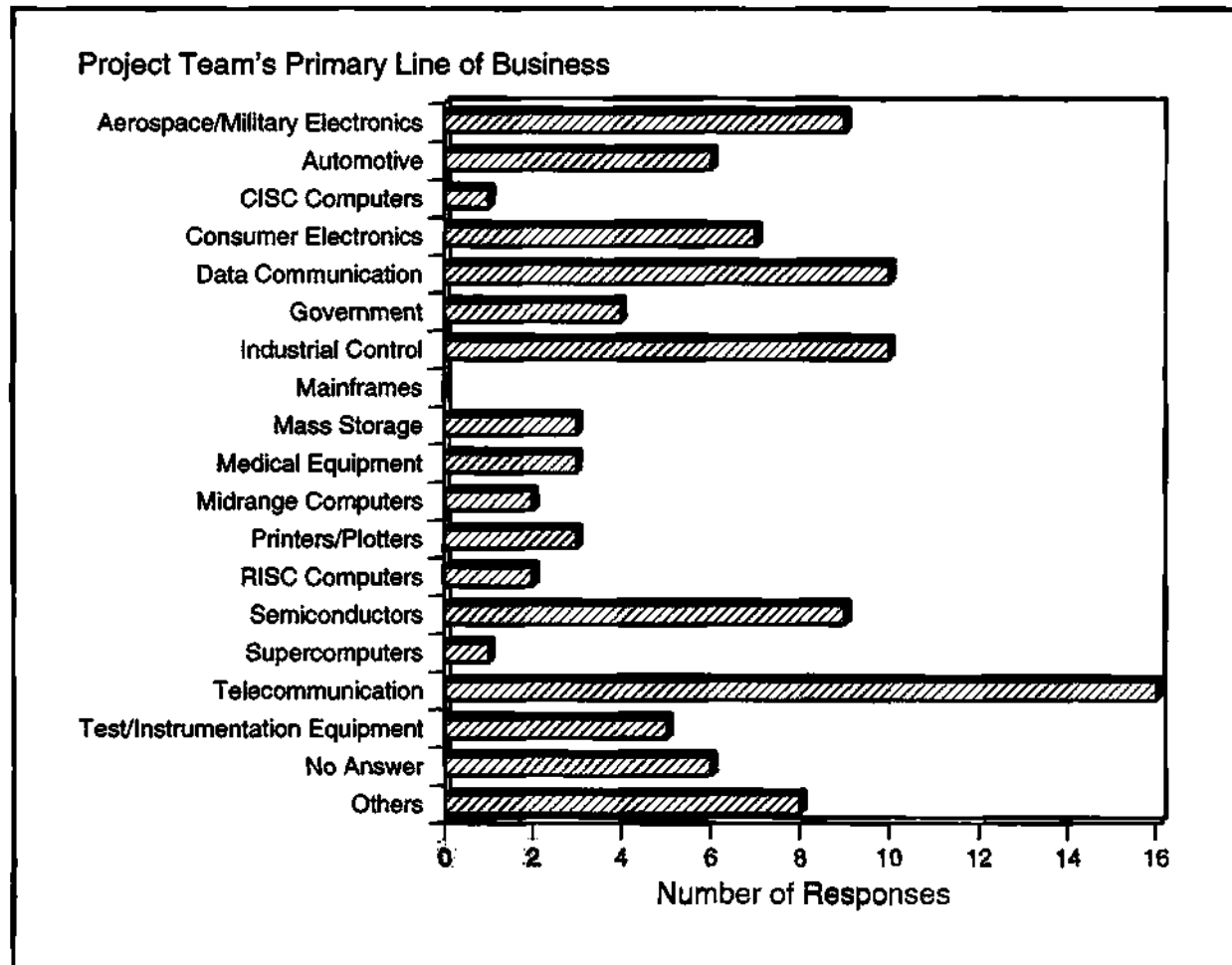
Figure 2-10
European Respondents' Primary Line of Business



Source: Dataquest (November 1992)

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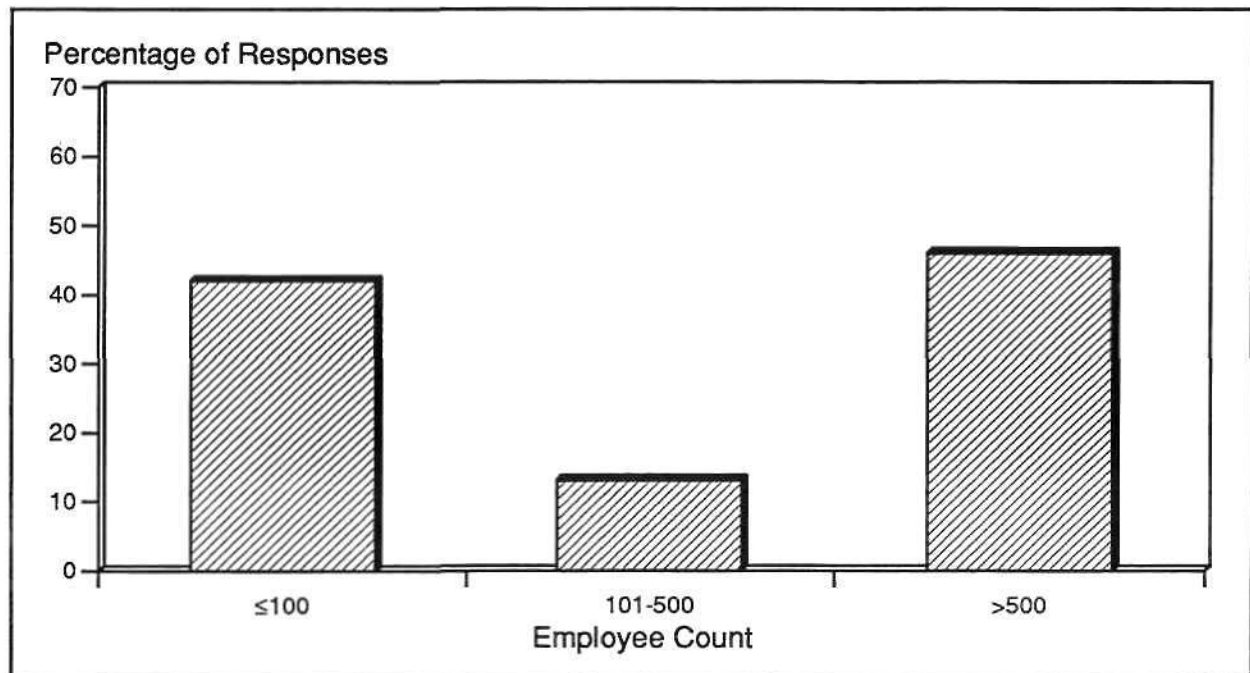
Figure 2-11
European Respondents' Project Team's Primary Line of Business



Source: Dataquest (November 1992)

G2002447

Figure 2-12
European Distribution of Company Employee Count



Source: Dataquest (November 1992)

G2002448

Broader Industry Classifications

To provide a more statistically correct view of end-application markets, in certain situations Dataquest has grouped the respondent's answer into broader categories. Shown below are the broader industry classifications and the respondent categories that comprise them.

Mil/Aero

Military/Aerospace Electronics

Government

Communication

Data Communication

Telecommunication

Data Processing

RISC

CISC

Midrange Computers

Mainframes

Supercomputers

Printers/Plotters

Mass Storage

Consumer

Consumer Electronics

Industrial

Industrial Control

Medical Equipment

Test/Instrumentation Equipment

Automotive

Semiconductor

Semiconductor

Others

Others

Chapter 3

The Design Process

A perspective on the design process is of tantamount importance in trying to recognize opportunities in the EDA market. By understanding how design groups create electronic systems, one can more effectively plan for new ways to enhance the productivity of the project team, and hence provide effective automation tools.

In this section, Dataquest analyzes, in particular, the pressures facing designers worldwide and the components of a design group. This information is crucial in identifying new opportunities for improvement in the design process. All Chapter 3 figures referenced in text appear at the end of Chapter 3.

Pressures Facing Design Groups

Quantifying the factors that contribute to product success is critical for companies in the fast-paced electronic products market. Not surprisingly, electronic designers are very cognizant of the attributes necessary for developing successful systems. Dataquest requested that each respondent select the three most important factors for market success of electronic systems. The most important factors—time to market, reducing cost, and increasing functionality—are shown in Figures 3-1, 3-2, and 3-3.

Of secondary importance to designers worldwide is increasing the quality and reliability of the system, and increasing the speed. With the shortening of product life cycles, the value of long-term reliability of a system is diminished, hence its lower rating. This view must be weighed in conjunction with the very important goal of reducing cost. Focusing on test methodology and test structures will ultimately reduce the cost of high-volume systems by improving yields and reducing debug time during the design process. System speed, which at first blush one would think to be of critical importance, consistently ranks fourth (or lower), signifying that it is more important to be quicker to market with a cost-effective solution than to have a faster product that is late to market.

Design Group Components

Design groups are as diverse as the electronic products that are produced. In examining the components of the design group, Dataquest sees a wide variety of structures. The typical North American project team has approximately 14 engineers assigned to it. This number may be misleading, however, due to the wide

distribution of responses. Survey results showed that design groups may consist of 1 to more than 50 engineers. Figure 3-4 shows mean number of engineers per project for a variety of application areas represented geographically. Of particular note to EDA vendors, larger design groups will require increasingly more sophisticated design management and revision control tools in the future. Areas of opportunity exist in the large communications and data processing companies, as they tend to have larger design teams. Examining the data geographically, North American design teams consistently have a larger mean number of engineers, reflecting the increased complexity of designs developed. Dataquest anticipates that the consumption of design management and revision control tools will be led by North America for the foreseeable future.

To determine the makeup of a typical electronic design team, Dataquest asked users what categories of engineers were applied to a design project. Figures 3-5, 3-6, and 3-7 show the results of this question, in total number of responses. This information may be used as a gauge of the relative magnitude of the population of each type of engineer. For example, it would be safe to say that worldwide, there are more digital designers than any other type of engineer. Additionally, a significant number of engineers call themselves system architects. It is important to note that these are users' perceptions, and that the term "system architect" may be open for individual interpretation.

The Design Process

To better understand the design process, Dataquest investigated the percentage of time spent in each of the major categories of electronic design. Dataquest split the design process into the following areas (discussed in greater detail later in this chapter):

- Specification, definition of design, and system partitioning
- Logic design and verification
- Design for test and test vector development
- Systems integration and verification
- Prototype debugging

The Design Wedge

As shown in Figure 3-8, the design process may be thought of as a three-dimensional wedge, with the x-axis representing design time, the y-axis representing design errors uncovered, and the z-axis representing the design implementation flexibility. At the very first stage of the design process, specification and definition, the project team has the greatest amount of flexibility and uncovers a large share of potential design problems. As the team moves down the design process, the flexibility and amount of "what-if" analysis begins to decrease. Additionally, the majority of glaring errors of the design are uncovered and resolved. As one travels along the x-axis, the number of design errors uncovered decrease; however, more time is spent in identifying and resolving these bugs. The

forces acting upon the design wedge are the critical factors to market success discussed previously. These forces, or vectors, act upon the design wedge and contribute to the overall shape of the design process. The two characteristics that define a vector—direction and magnitude—are equally valid in describing market forces and impact upon the design wedge. For example, the time-to-market vector will tend to decrease the length of the wedge along the x-axis, while increasing system speed will necessitate an expansion in the design flexibility axis, as designers pursue alternate design styles and process technologies to decrease signal delays.

The percent of time spent in each of the steps in the design cycle for each geographic region is shown in Figure 3-9. While subtle differences exist in the design styles and the amount of time spent on each step, these differences may be statistically insignificant overall.

Definition of Design Specification and System Partitioning

The following inferences can be drawn, based on the results of our survey:

- Consumes more than one-fifth of the overall design cycle
- System architects rank only behind digital designers in population
- Design specification and system partitioning is most flexible portion of the design cycle

The automation of system-level design is one of the few untapped wells in electronic design automation. The time spent on this portion of the design process, in addition to the number of self-labeled system architects, makes this area an enticing target to companies that can provide properly designed automation tools. Dataquest foresees significant opportunity in this area, and indeed a few companies have targeted this area for products that will be introduced in the next 6 to 12 months.

Logic Design and Verification

The following conclusions can be drawn from our survey:

- Consume the most of the design cycle
- Has the largest population of engineers
 - Digital designers
 - Simulation and verification support engineers
- Has the largest numbers of EDA tools
 - Design entry
 - Logic synthesis
 - Verification tools

This area, more than any other, has received the brunt of the focus of the EDA community. The increasing time-to-market pressures facing the electronic designer results in design teams searching for new ways to compress the design cycle. Of critical importance is the need to compress the design of ASIC devices and printed circuit boards. Indeed, electronic designers anticipate compressing the board and ASIC design cycles by between 25 and 30 percent throughout the next five years, as shown in Figures 3-10, 3-11, 3-12, and 3-13. Particularly striking in the survey results were the geographic differences between Japanese and North American design cycles, with Japanese design cycles on average two to three months shorter than North American designs. Further analysis shows that the Japanese designer is creating less complex designs. The average ASIC design sign in Japan was approximately 18,000 gates in 1992, while in North America the average ASIC size was 28,000 gates for the same period. Also, the number of signal layers in a Japanese board was less than its North American counterpart (see Figure 4-5 in Chapter 4).

Clearly, electronic designers want to continue to compress their design cycles, although the methods and technique they will employ to shorten the design process is not so obvious. More and more, designers are turning to top-down design and design reuse to enhance their productivity. Indeed, design reuse will play a significant role in the coming years, as the gate capacity of ASIC devices continues to increase. As shown in Figure 3-14, approximately 35 percent of all designs are reused circuitry from a previous design. Dataquest anticipates that this percentage will increase toward 50 percent during the next five years as design management tools improve.

Design for Testability and Test Vector Development

Based on the results of our survey, the following inferences can be drawn:

- Consumes a significant amount of the design cycle
- Japanese designers are more concerned about test and spend more time on test issues
- New tools are emerging to shorten the test process and improve testability

The perceptions of designers as they relate to fault coverage are particularly important to EDA vendors of test automation tools. Figure 3-15 shows the acceptable fault coverage for ASIC designs by region. Figure 3-16 shows fault coverage acceptability by application.

Perhaps of greater significance is the summation of the total ASIC design market addressed by a tool offering a given fault coverage. The sum percentage of the ASIC market addressed given the fault coverage capability is shown in Figure 3-17. For example, a tool that consistently offers 95 percent fault coverage may address up to 60 percent of the ASIC design market, whereas a tool offering 99 percent fault coverage may apply itself to 95 percent of the design market.

While there is a definite need for fault coverage, it is not free. There is a significant penalty in both cost and speed for increasing the testability of a design. To determine how much electronic designers are willing to pay for increased testability, Dataquest cross-correlated the targeted fault coverage a designer wishes to achieve, with the penalty he is willing to pay in both speed and density. Figure 3-18 shows the results of this analysis. In general, designers recognize that they will have to pay an increasing penalty in speed and cost to achieve higher levels of testability. Particularly important, however, is the fact that the design engineer will more readily pay for an increased component cost than a slower system speed.

Systems Integration and Verification

The systems integration and verification portion of the design cycle consumes the same amount of time as the test development phase. According to users, there are few ways to approach this problem. Currently, there exists three methods of verifying the integrity of a system:

- Simulation of critical parts
- Full system simulation
- Breadboarding

Figures 3-19, 3-20, and 3-21 show the current and anticipated future usage of each type of verification technique. Clearly, users have a strong desire to move away from breadboarding and toward full system-level simulation. However, this must be tempered with the ability of the EDA vendors to supply a valid solution. The following factors may retard the implementation of full-system simulation:

- Increased system complexity
- Simulation capacity
- Simulation speed
- Model availability

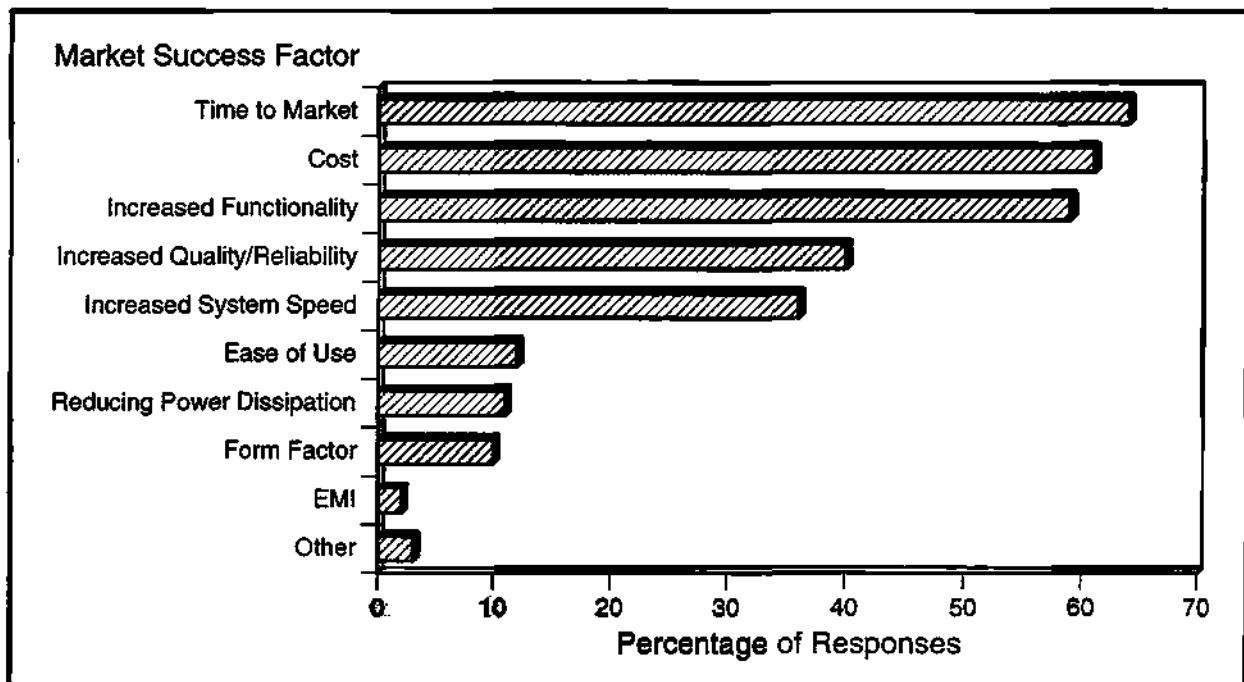
Dataquest believes that three years ago, user's response to planned usage of system verification would have been quite similar. The "Holy Grail" of full-system simulation continues to be sought after by the large majority of users, yet only a minority have been successful in obtaining the goal. Dataquest anticipates that breadboarding will continue to play an active role in system verification, and new advanced breadboarding capabilities using programmable technology will fuel the longevity of breadboarding.

Prototype Debugging

Prototype debugging consumes approximately 17 percent of the system design cycle worldwide. During this phase of the design process, two type of errors may be uncovered in the system: timing violations and functional violations. To gauge which type of design error was more problematic, Dataquest asked electronic designers which type of designer error consumed more time after the prototype was received.

In general, the responses were evenly divided, with 50 percent of the designers responding that functional violations took more time, and the other 50 percent reporting that timing error took more time to resolve, as shown in Figures 3-22 through 3-25. Dataquest foresees that advanced prototyping technologies, including breadboarding and ASIC prototyping, will continue to be used for tracking down functional difficulties after prototypes are received.

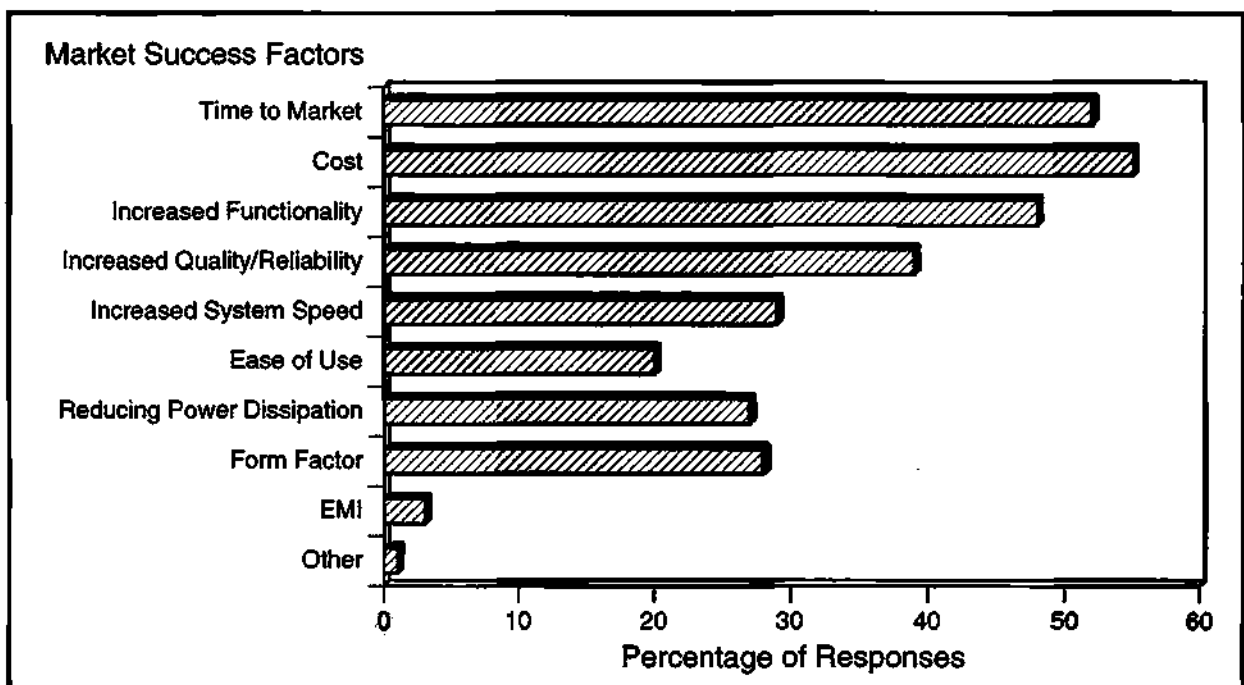
Figure 3-1
Factors Critical to Market Success, North America



Source: Dataquest (November 1992)

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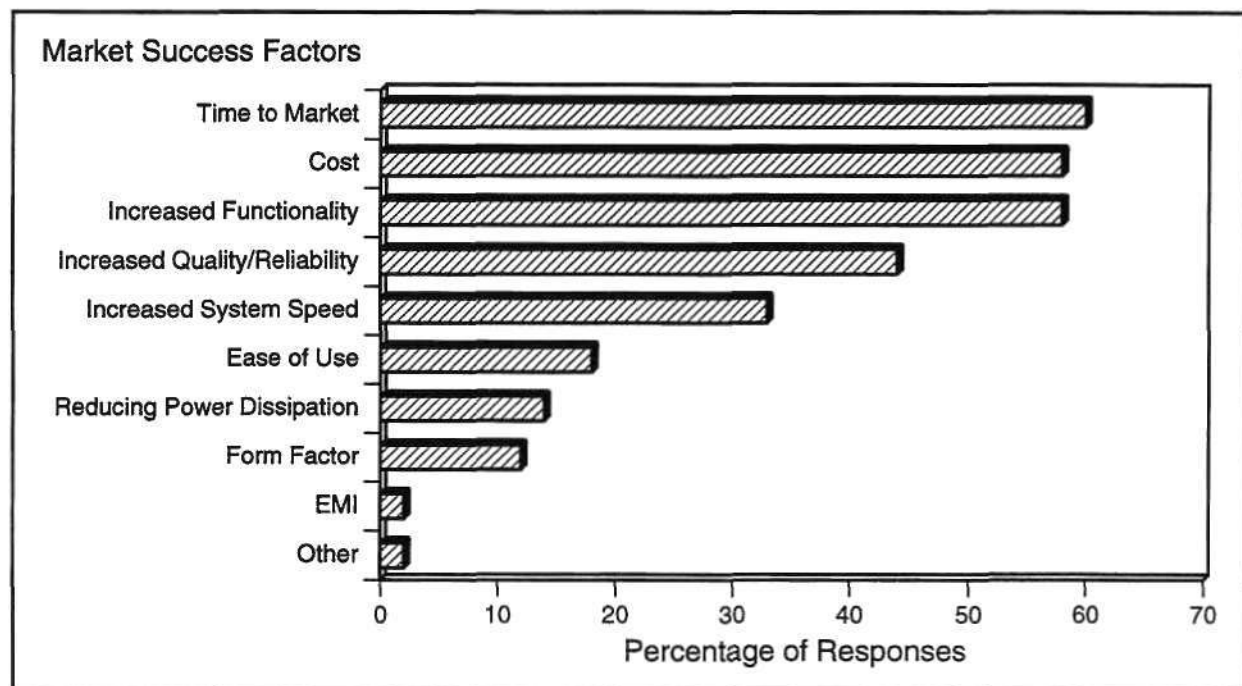
Figure 3-2
Factors Critical to Market Success, Japan



Source: Dataquest (November 1992)

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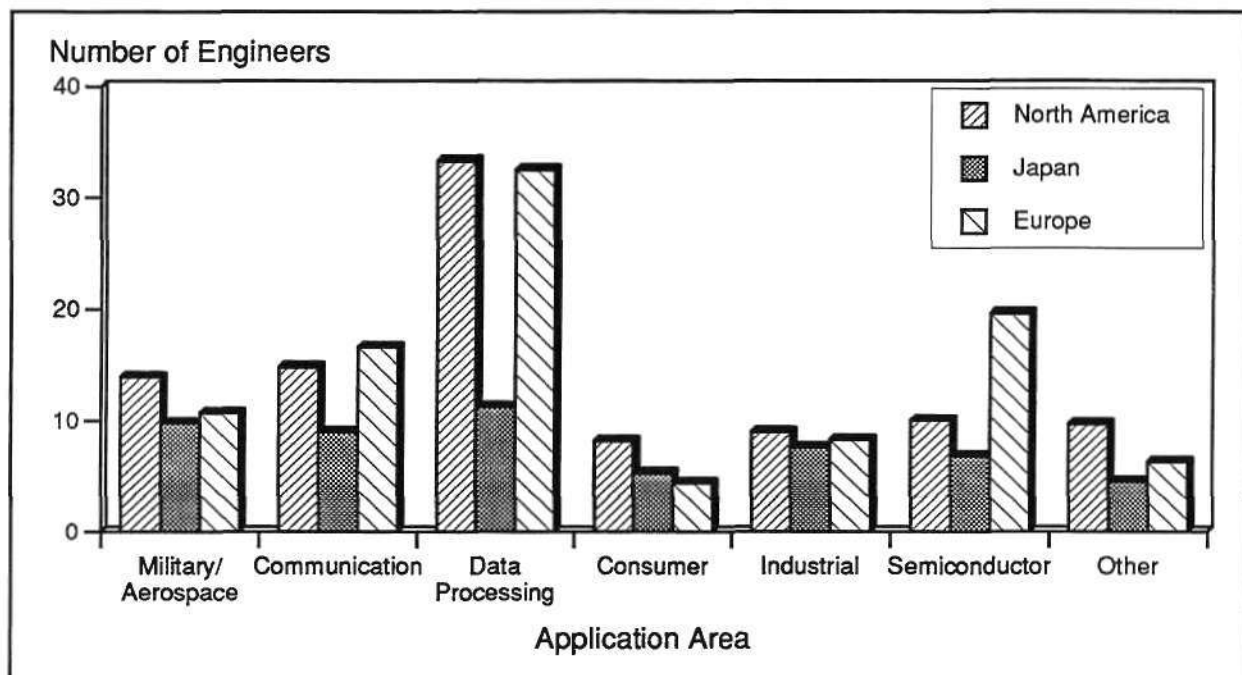
Figure 3-3
Factors Critical to Market Success, Europe



Source: Dataquest (November 1992)

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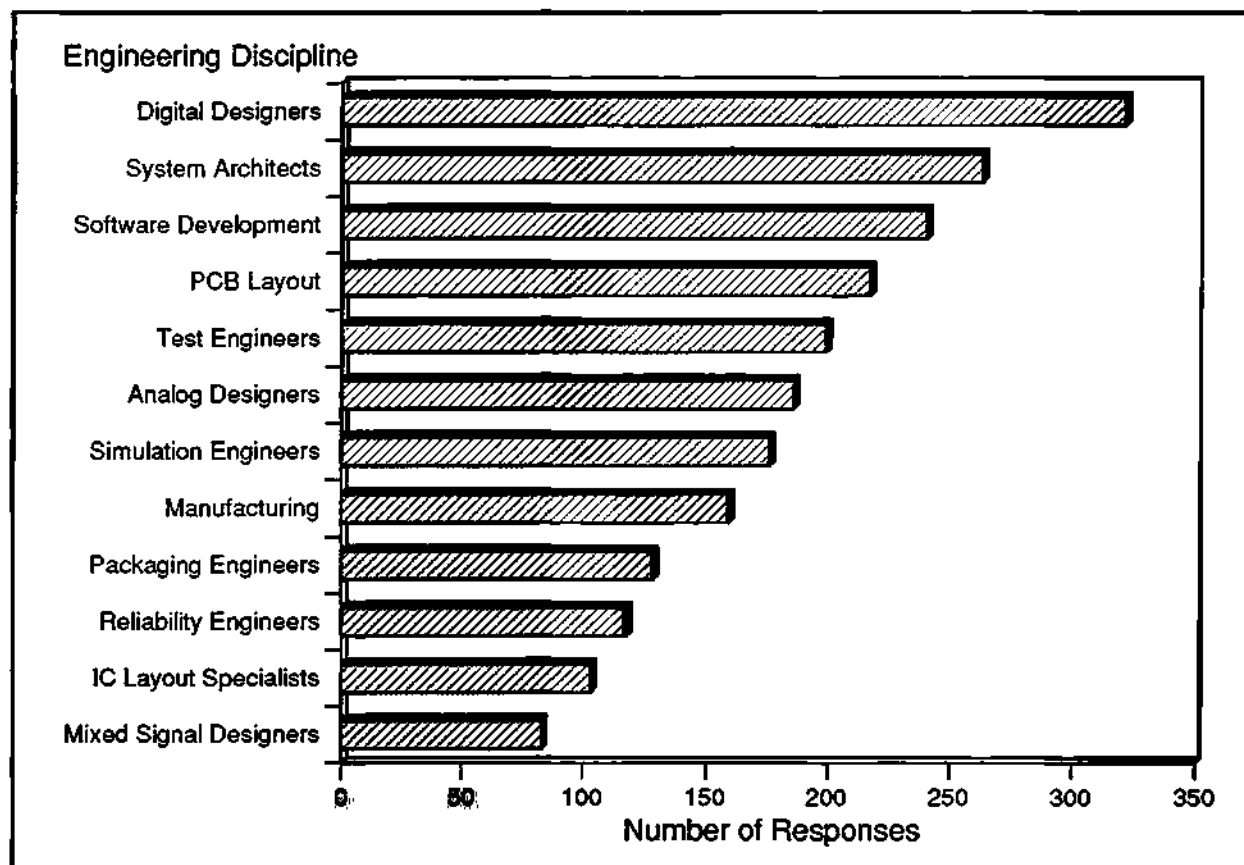
Figure 3-4
Mean Number of Design Engineers Assigned to a Project



Source: Dataquest (November 1992)

G2002452

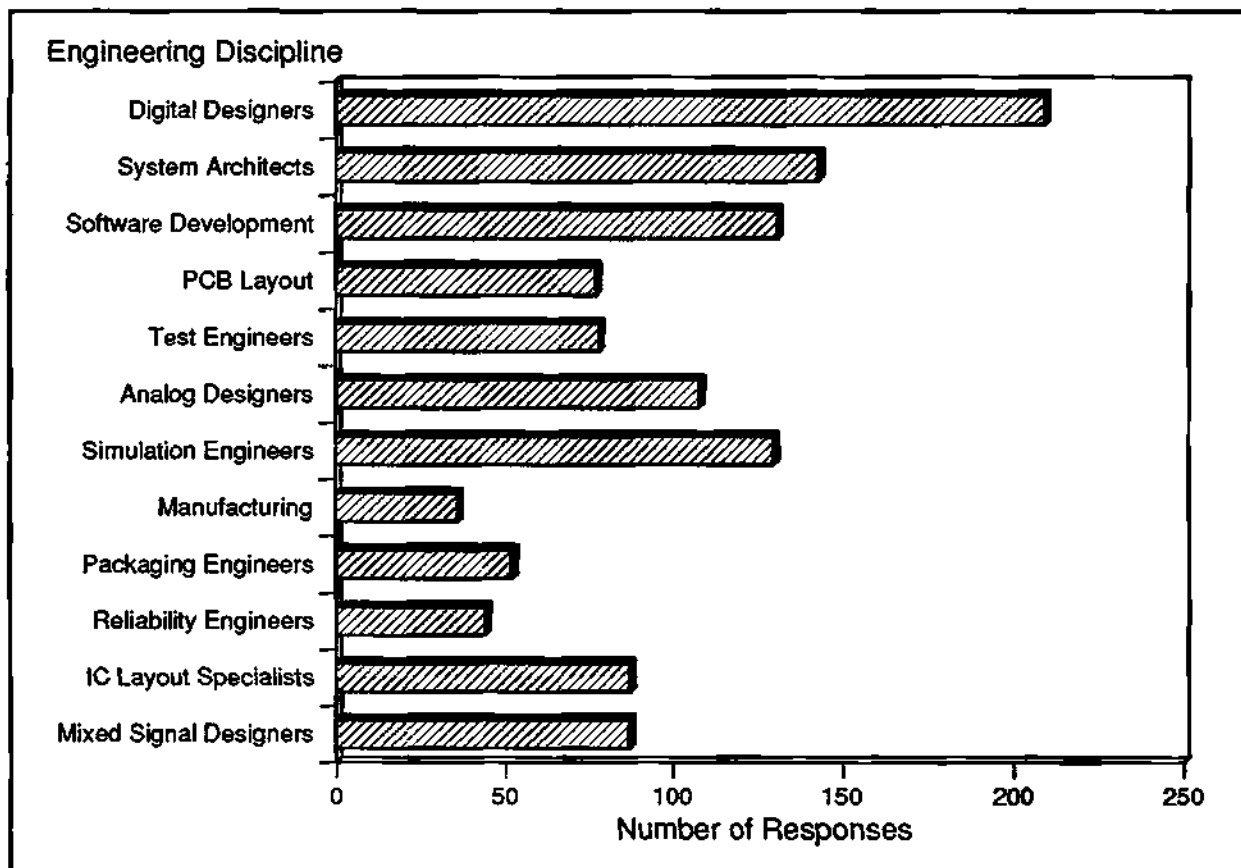
Figure 3-5
Types of Engineers Applied to a Project, North America



Source: Dataquest (November 1992)

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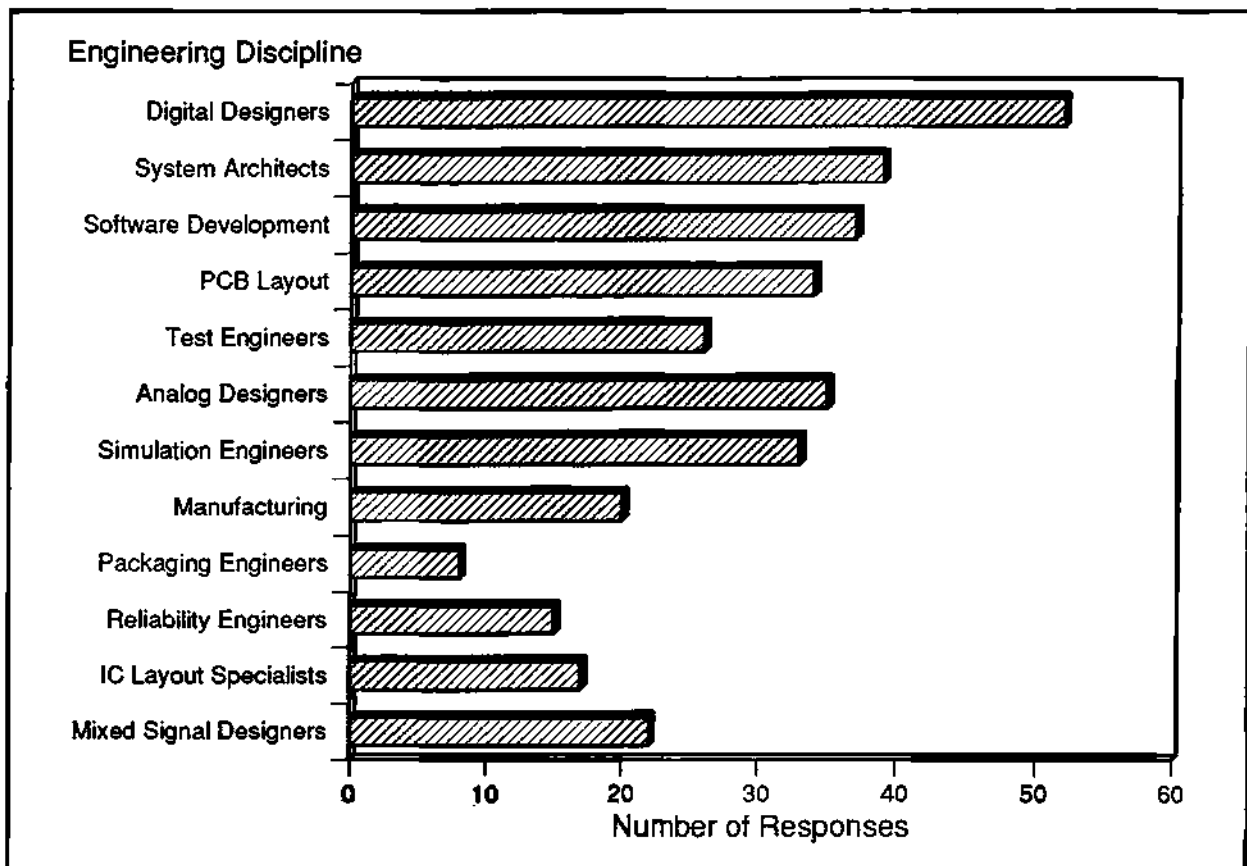
Figure 3-6
Types of Engineers Applied to a Project, Japan



Source: Dataquest (November 1992)

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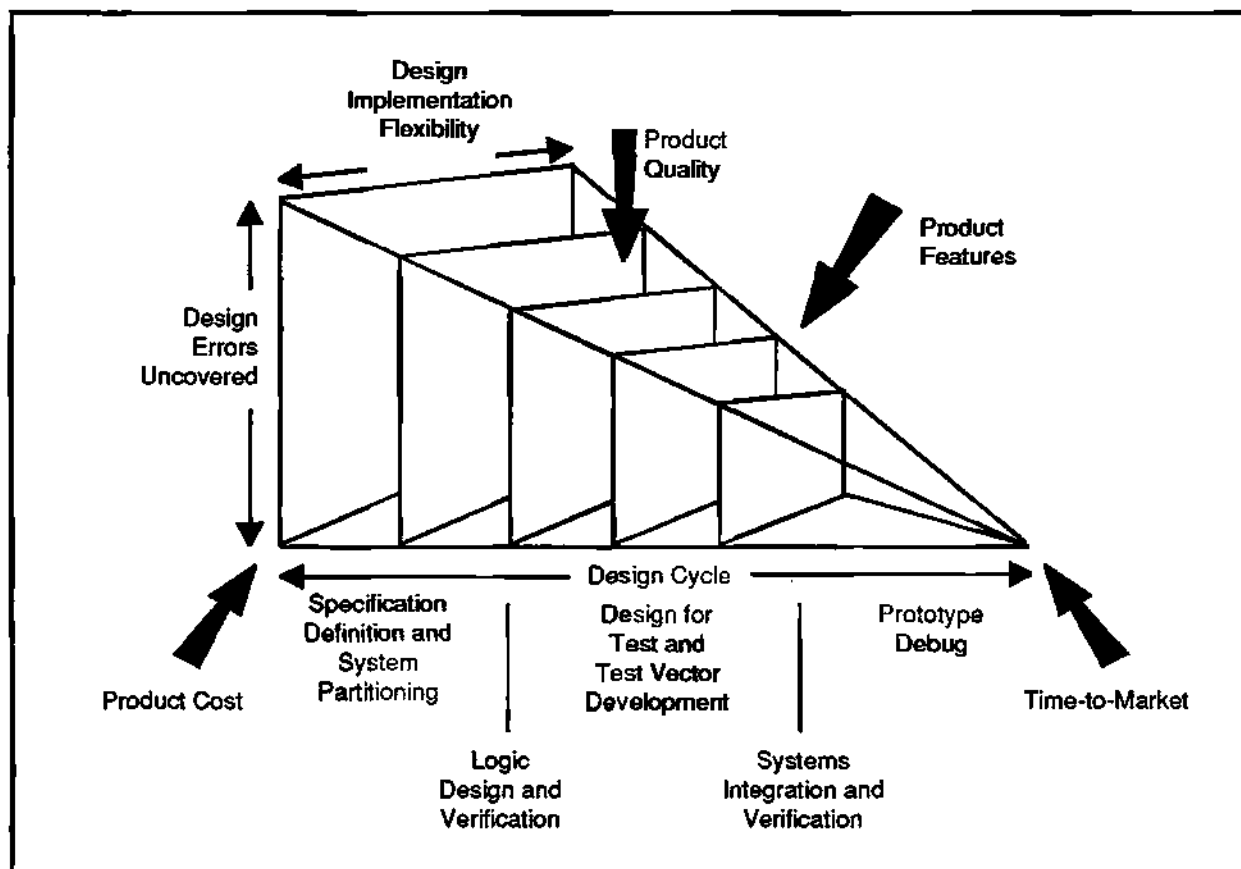
Figure 3-7
Types of Engineers Applied to a Project, Europe



Source: Dataquest (November 1992)

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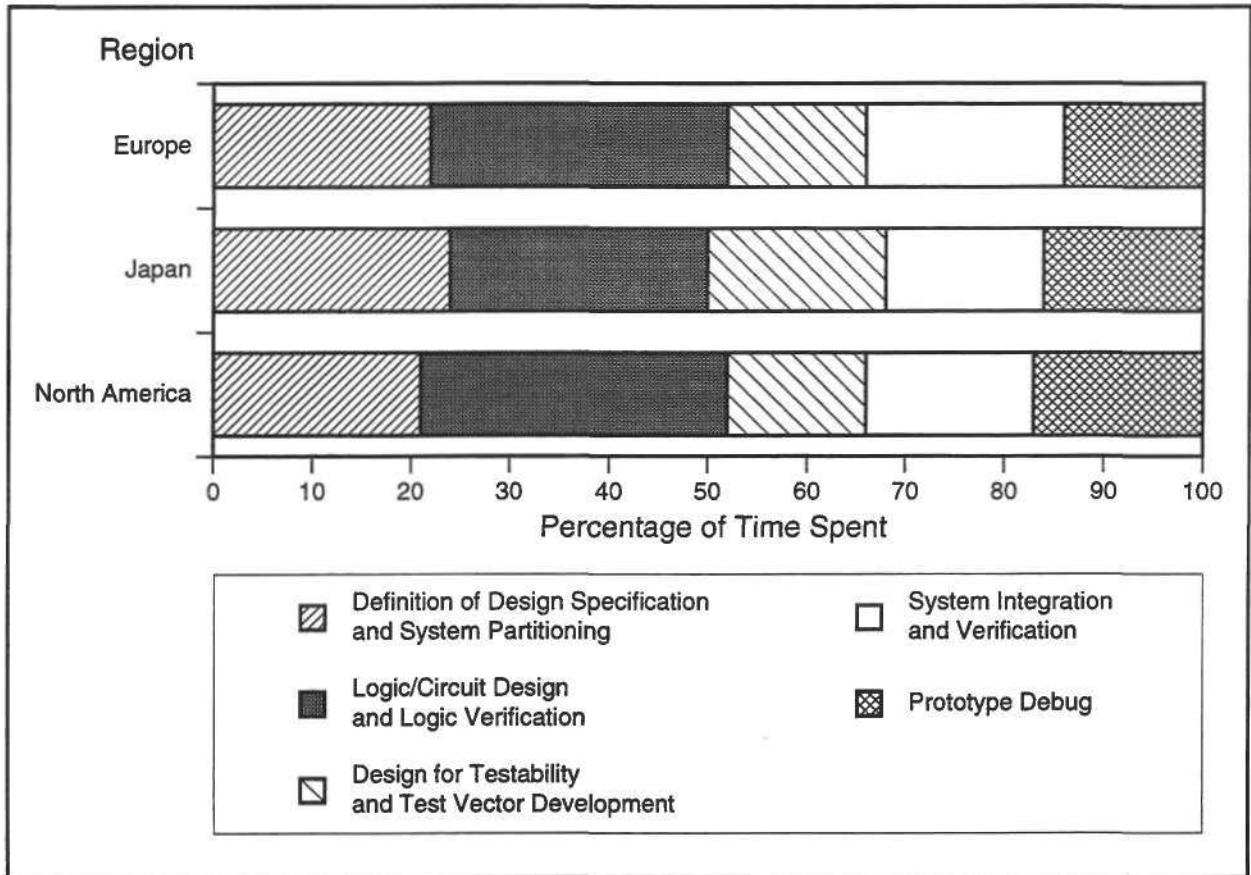
Figure 3-8
The Design Wedge



Source: Dataquest (November 1992)

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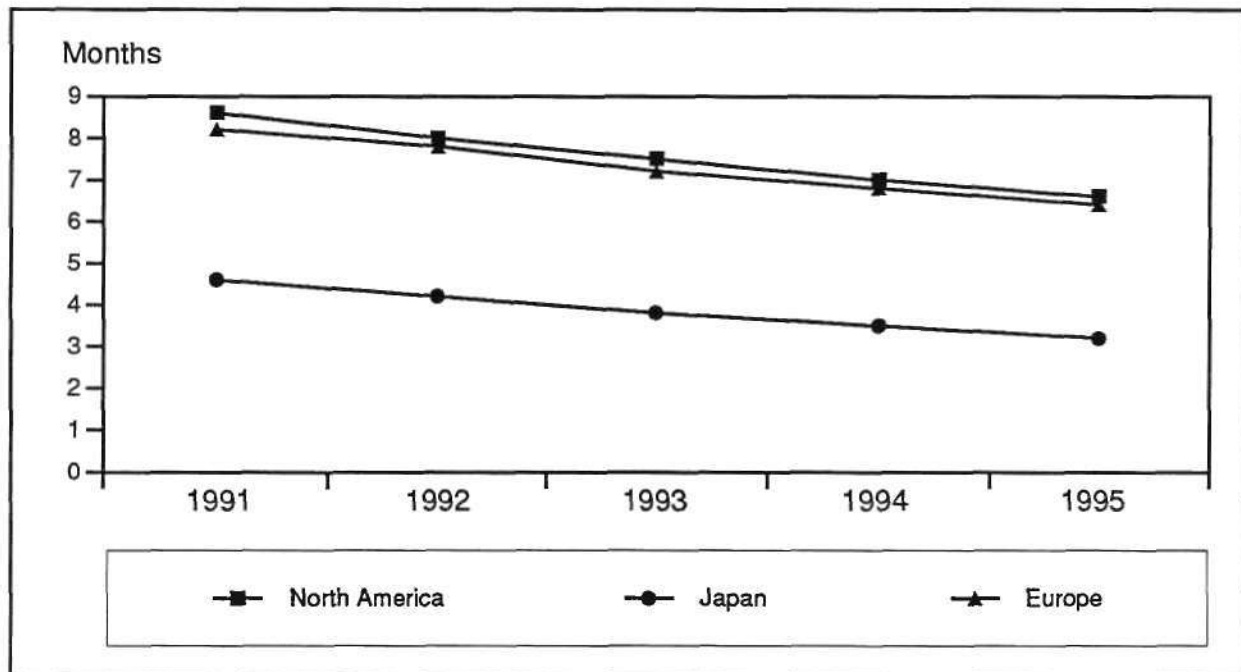
Figure 3-9
Percent of Time Spent on Design Cycle



Source: Dataquest (November 1992)

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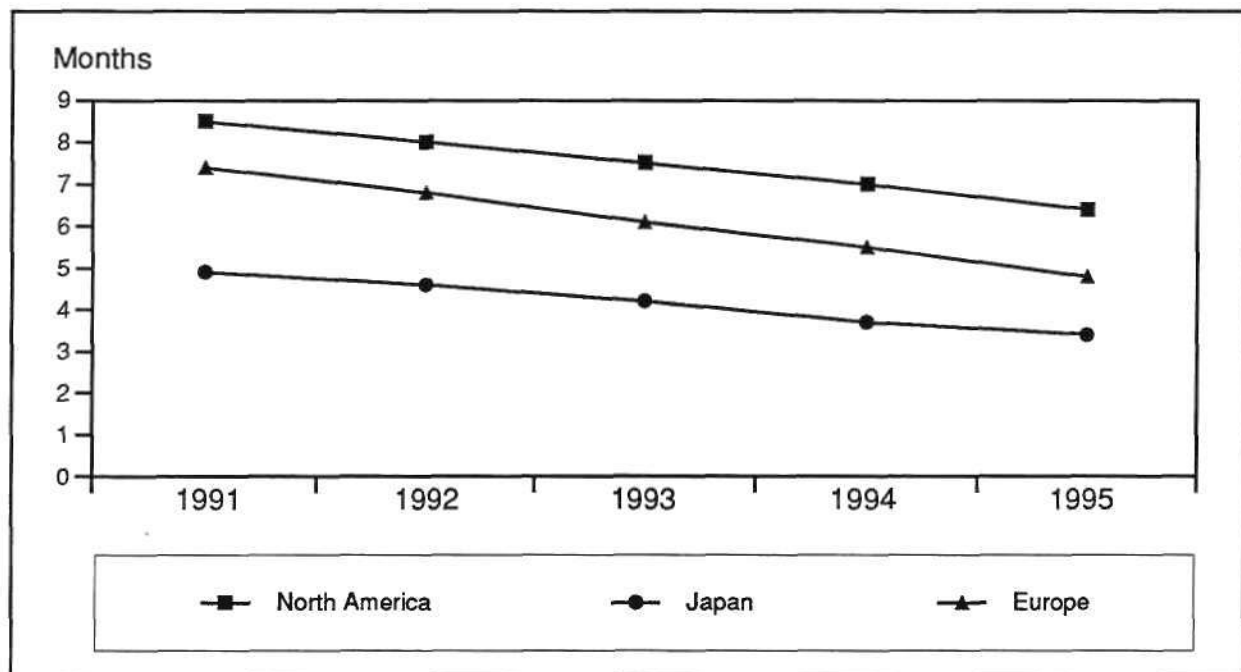
Figure 3-10
Board Design Cycle: Concept to Prototype



Source: Dataquest (November 1992)

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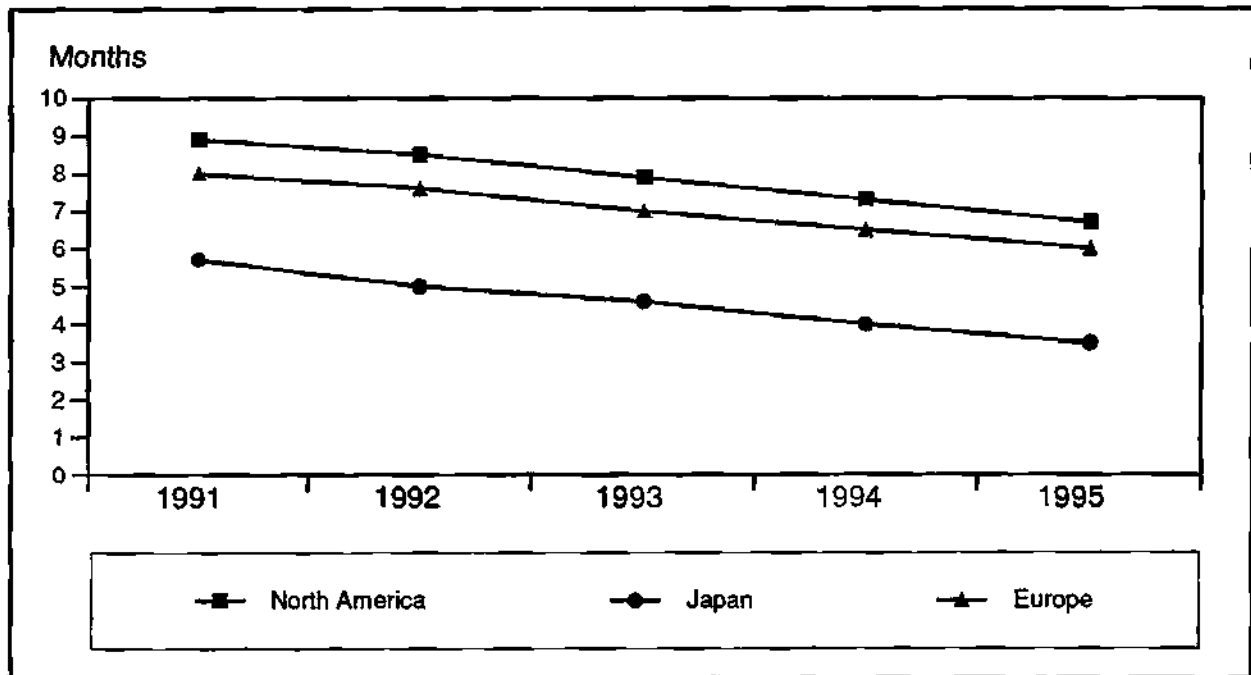
Figure 3-11
Board Design Cycle: Prototype to Production



Source: Dataquest (November 1992)

G2002460

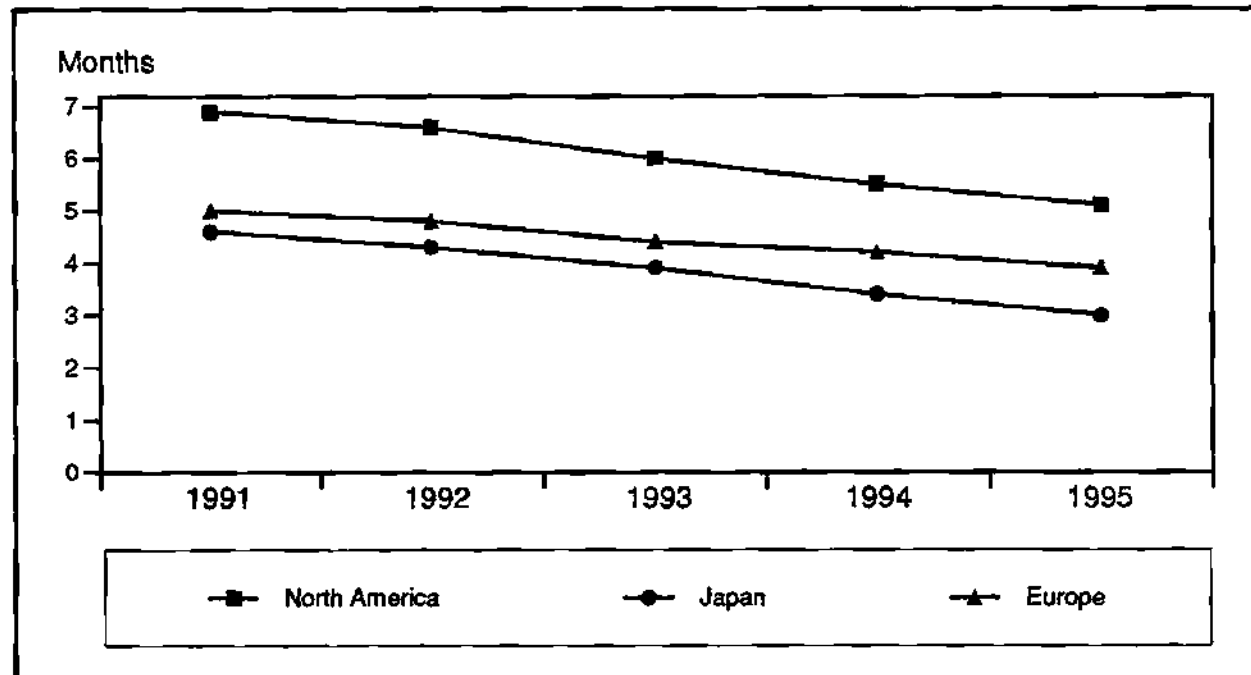
Figure 3-12
ASIC Design Cycle: Concept to Prototype



Source: Dataquest (November 1992)

G2002461

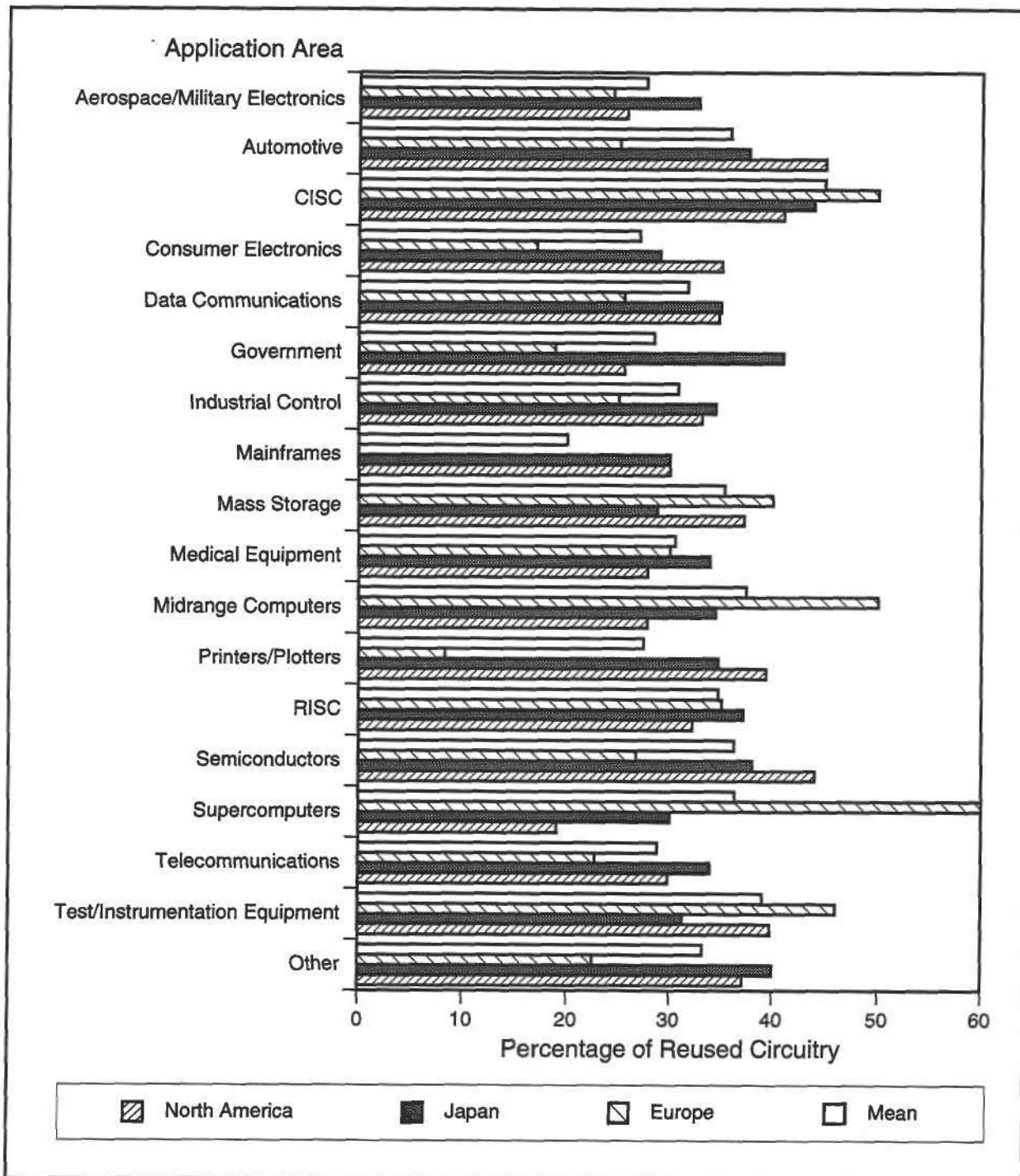
Figure 3-13
ASIC Design Cycle: Prototype to Production



Source: Dataquest (November 1992)

G2002462

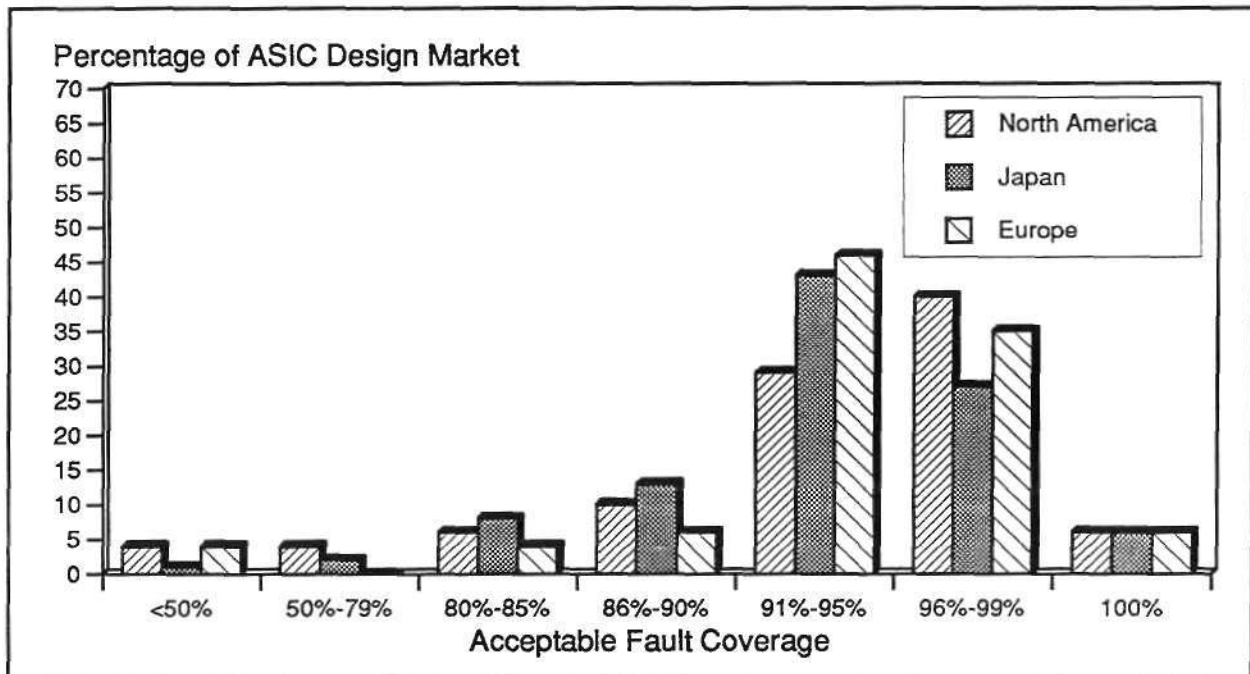
Figure 3-14
Design Reuse, by Application Area



Source: Dataquest (November 1992)

G2002463

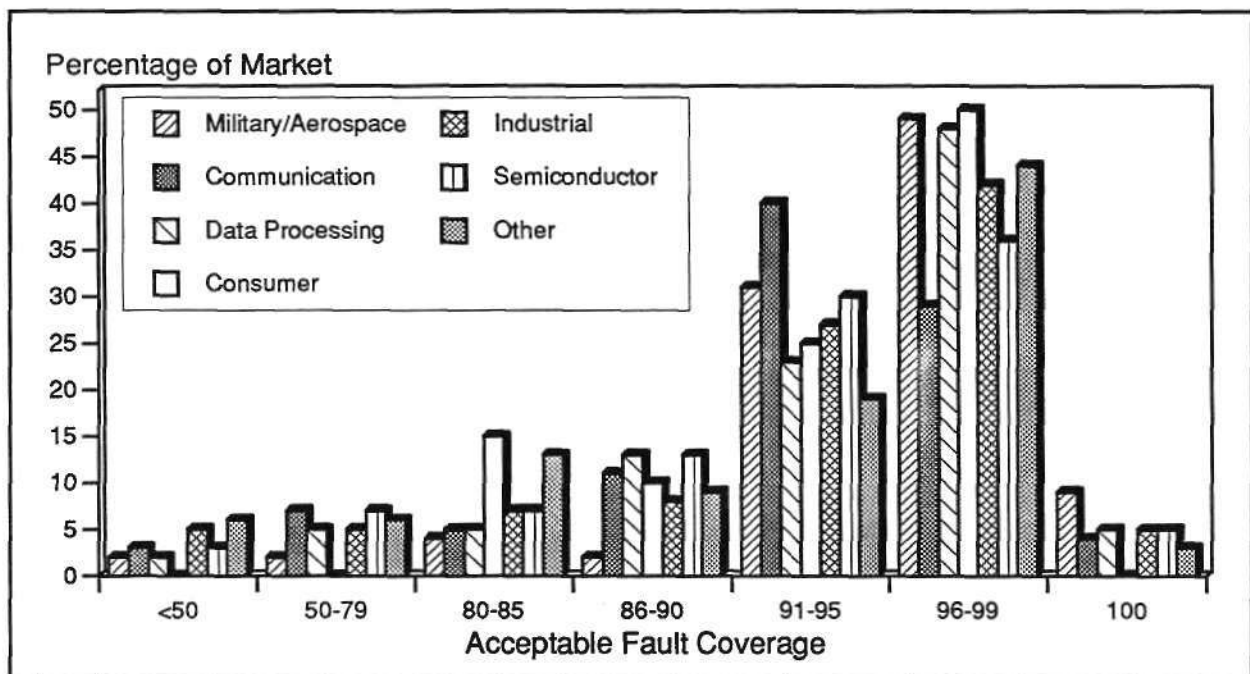
Figure 3-15
Acceptable Fault Coverage, by Region



Source: Dataquest (November 1992)

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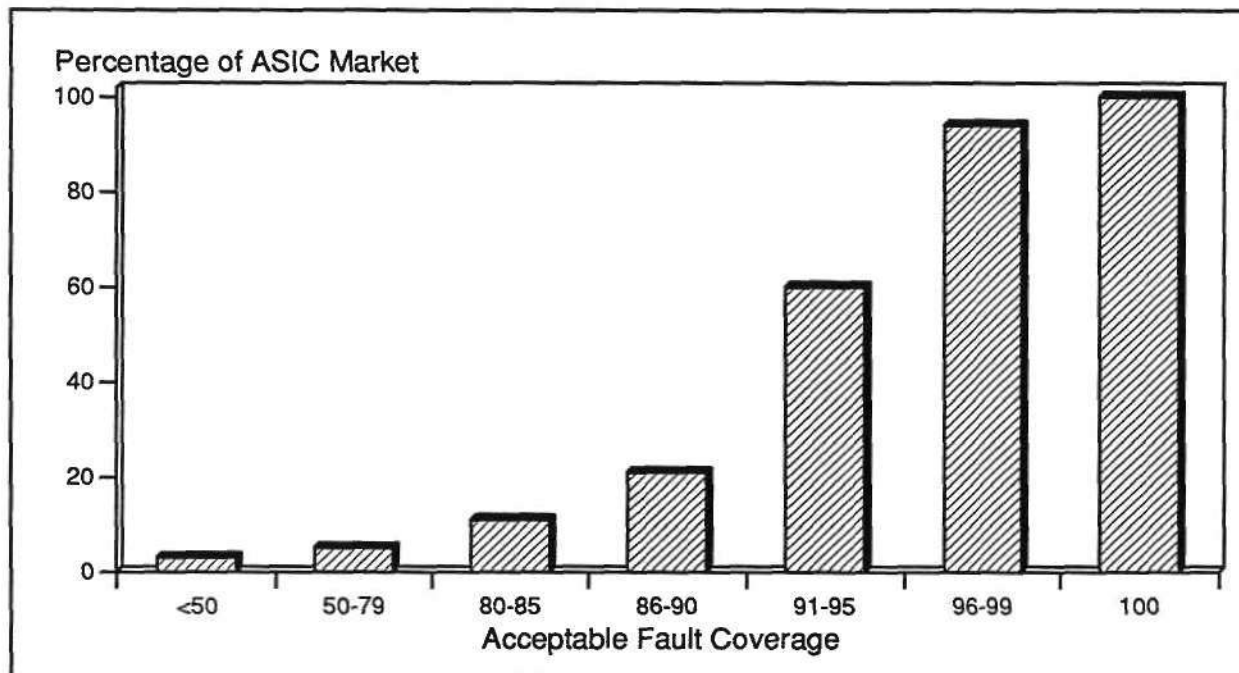
Figure 3-16
North American Fault Coverage Acceptability, by Application



Source: Dataquest (November 1992)

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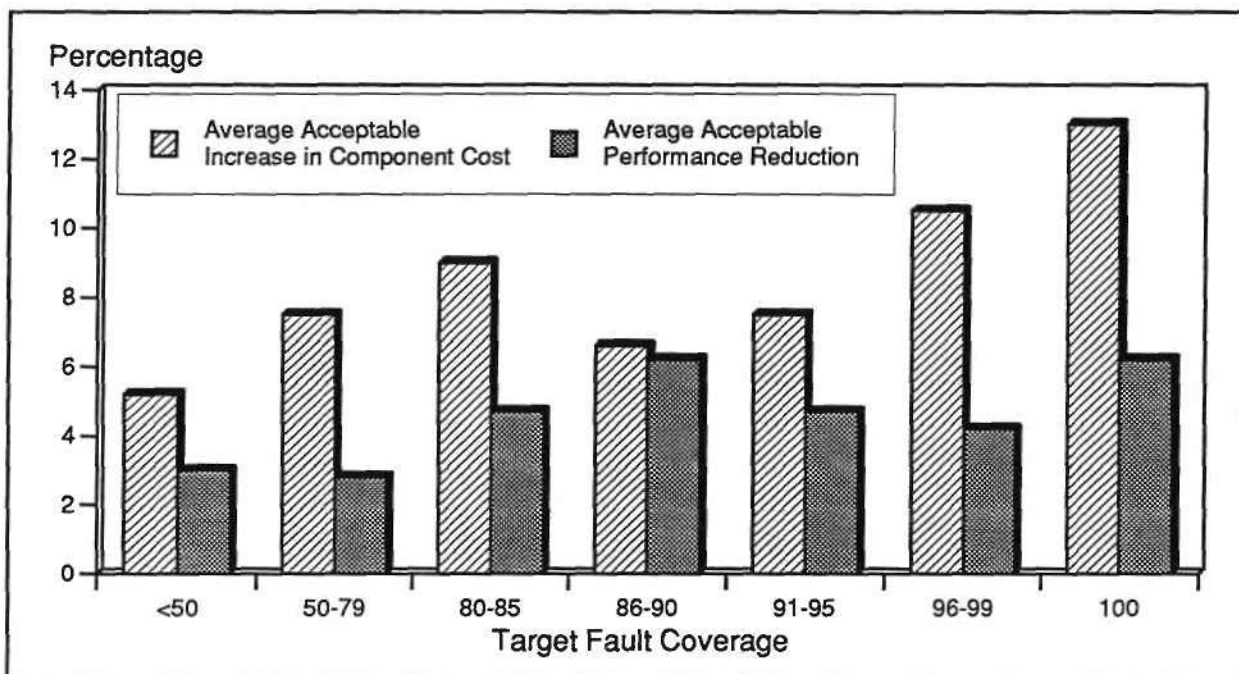
Figure 3-17
Percent of Worldwide ASIC Design Addressed, by Fault Coverage



Source: Dataquest (November 1992)

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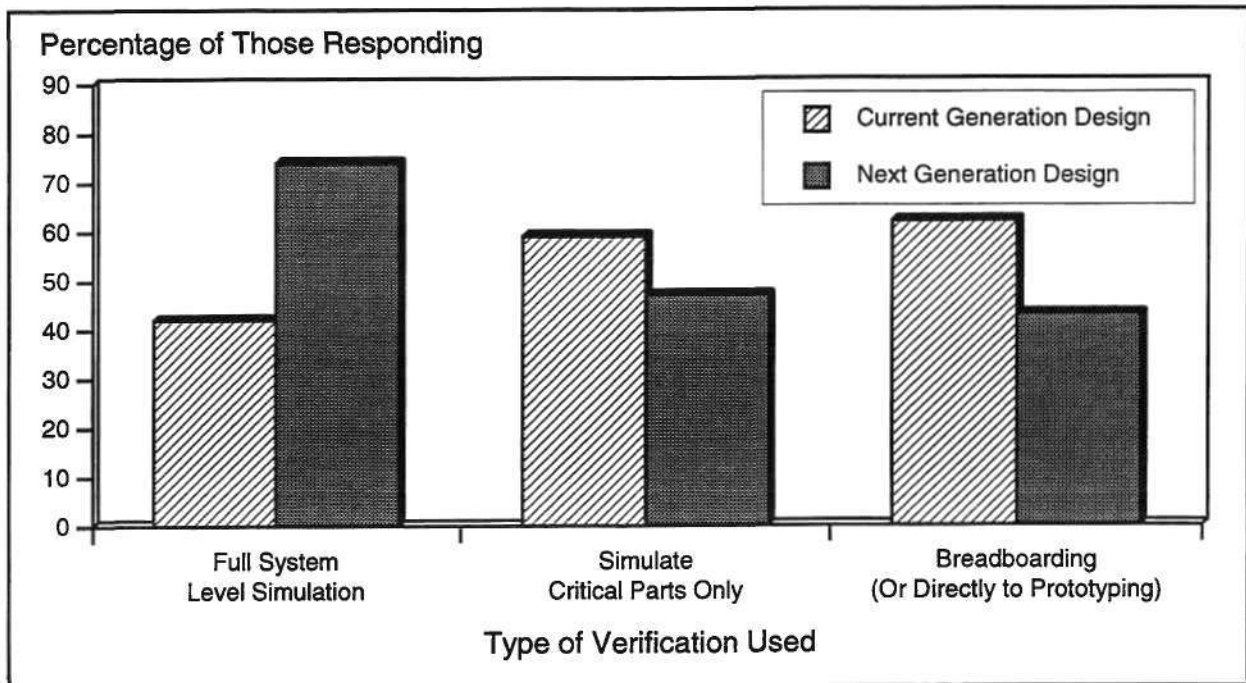
Figure 3-18
Acceptable Penalty for Targeted Fault Coverage, North America



Source: Dataquest (November 1992)

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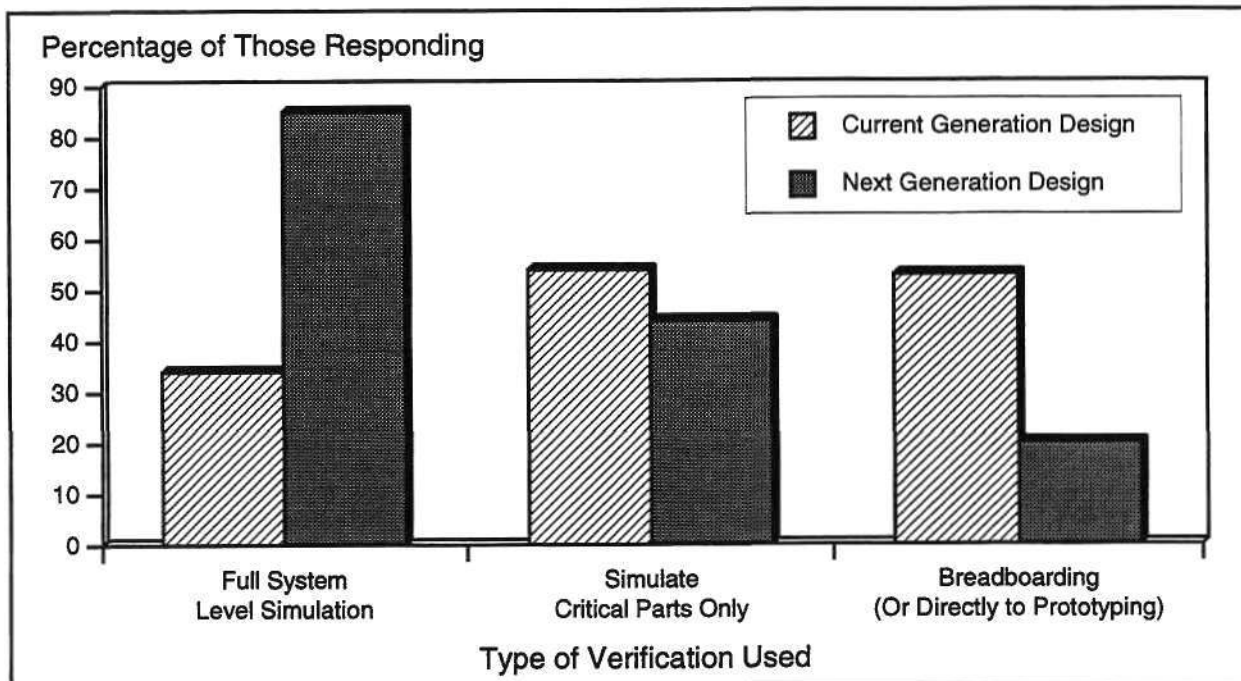
Figure 3-19
Design Verification Techniques, North America



Source: Dataquest (November 1992)

G2002468

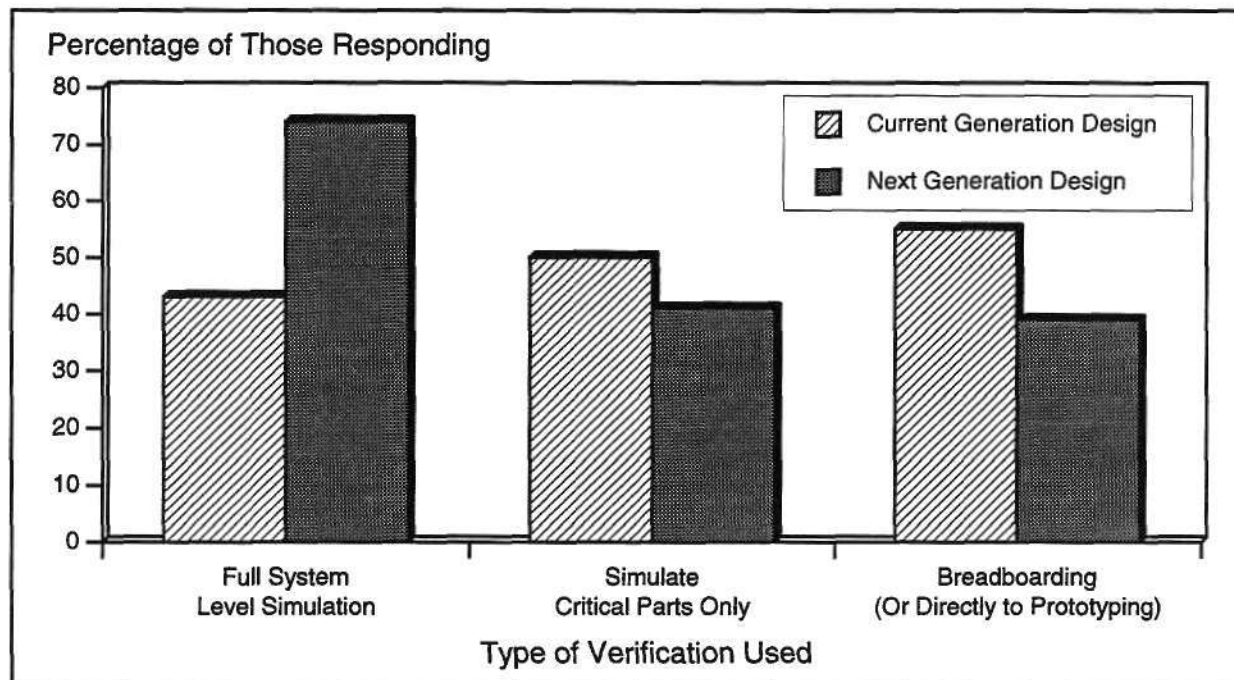
Figure 3-20
Design Verification Techniques, Japan



Source: Dataquest (November 1992)

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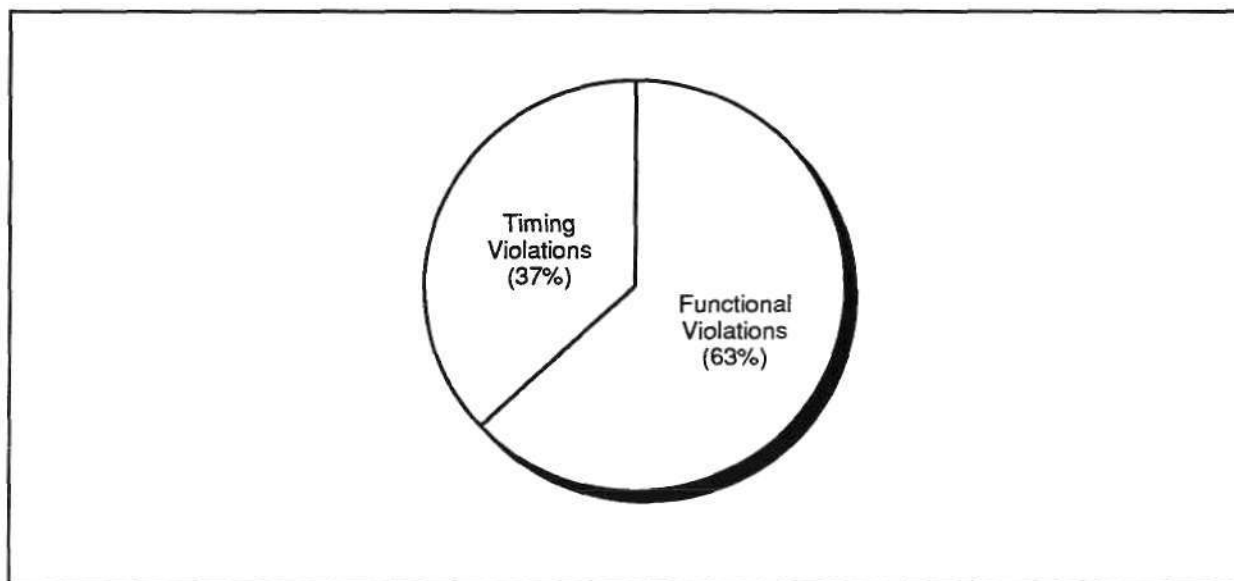
Figure 3-21
Design Verification Techniques, Europe



Source: Dataquest (November 1992)

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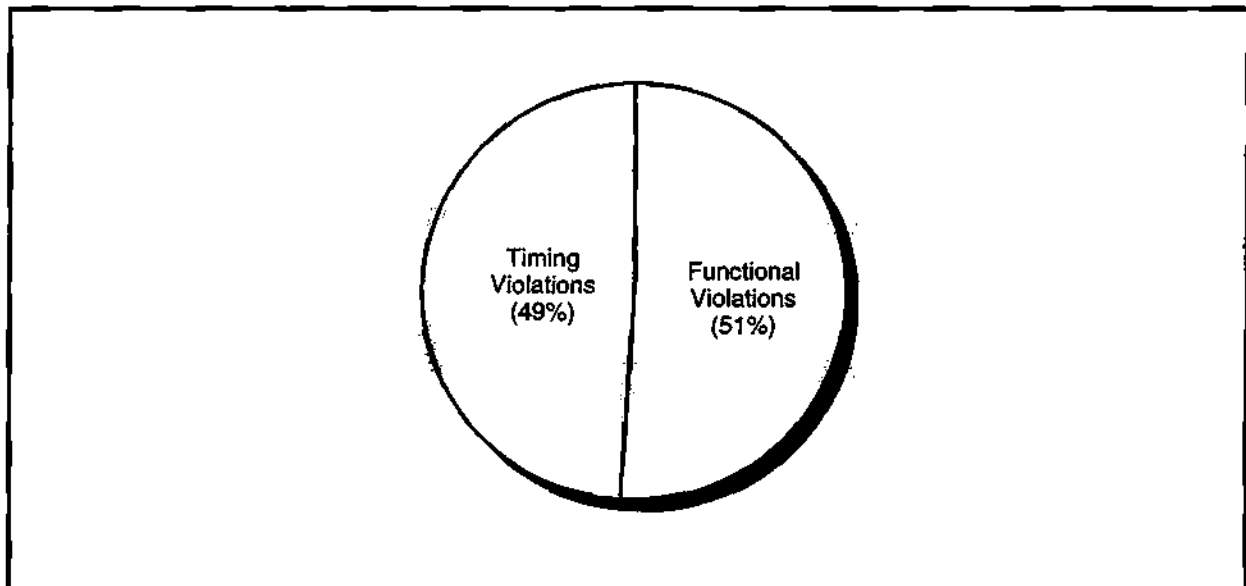
Figure 3-22
For Board Design: Which Consumes More Time during Design?



Source: Dataquest (November 1992)

G2002471

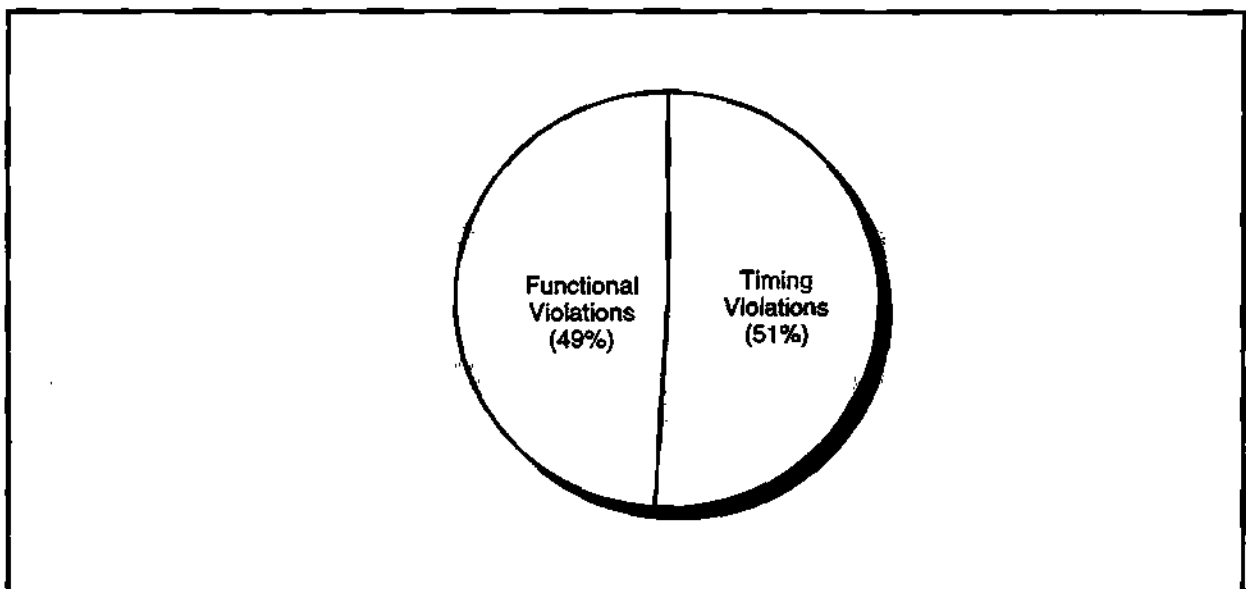
Figure 3-23
For Board Design: Which Consumes More Time after Reception of Prototype?



Source: Dataquest (November 1992)

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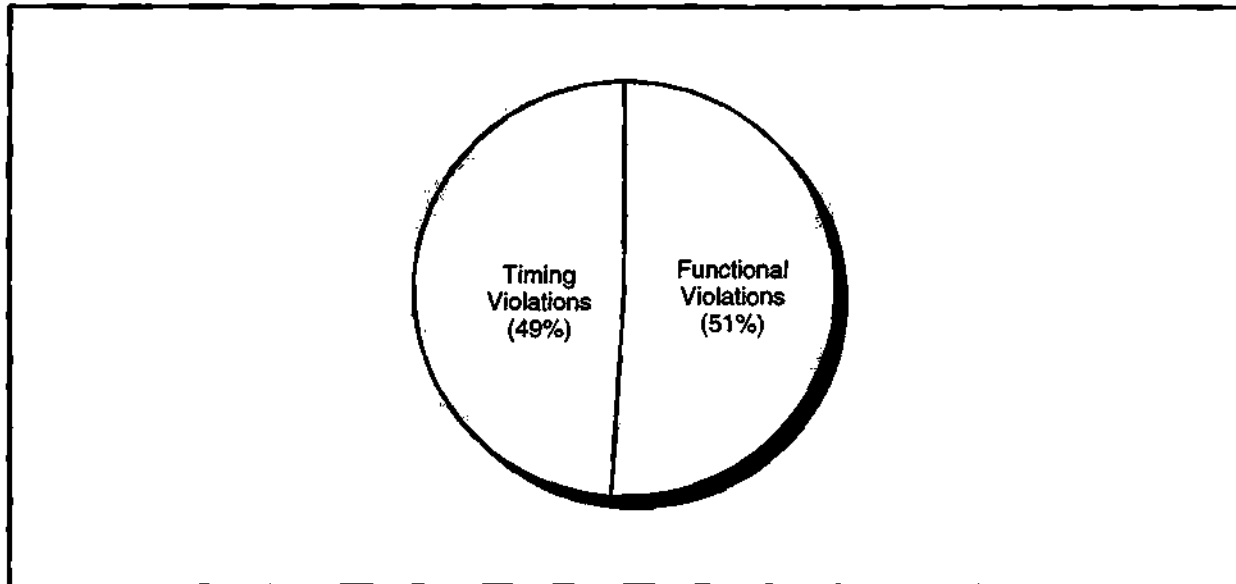
Figure 3-24
For ASIC Design: Which Consumes More Time during Design?



Source: Dataquest (November 1992)

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Figure 3-25
For ASIC Design: Which Consumes More Time after Reception of Prototype?



Source: Dataquest (November 1992)

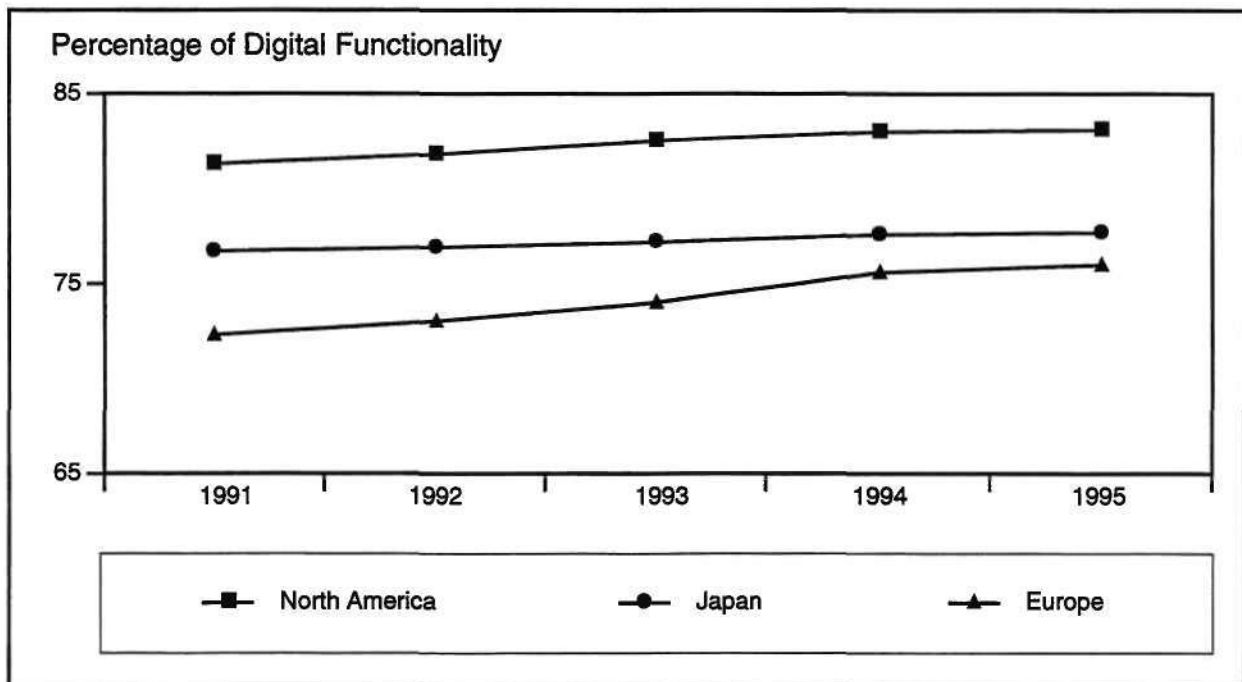
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Chapter 4

The Board Dissected

The bedrock upon which electronic designs rest is the printed circuit board. "The board" has evolved significantly during the past 20 years. In the early days of electronics, printed circuit boards were predominantly analog in nature; today, as shown in Figure 4-1, the board is primarily digital. According to users, the analog component is expected to continue to shrink—although not dramatically—during the next five years.

Figure 4-1
Percentage of Analog versus Digital Content for Printed Circuit Boards



Source: Dataquest (November 1992)

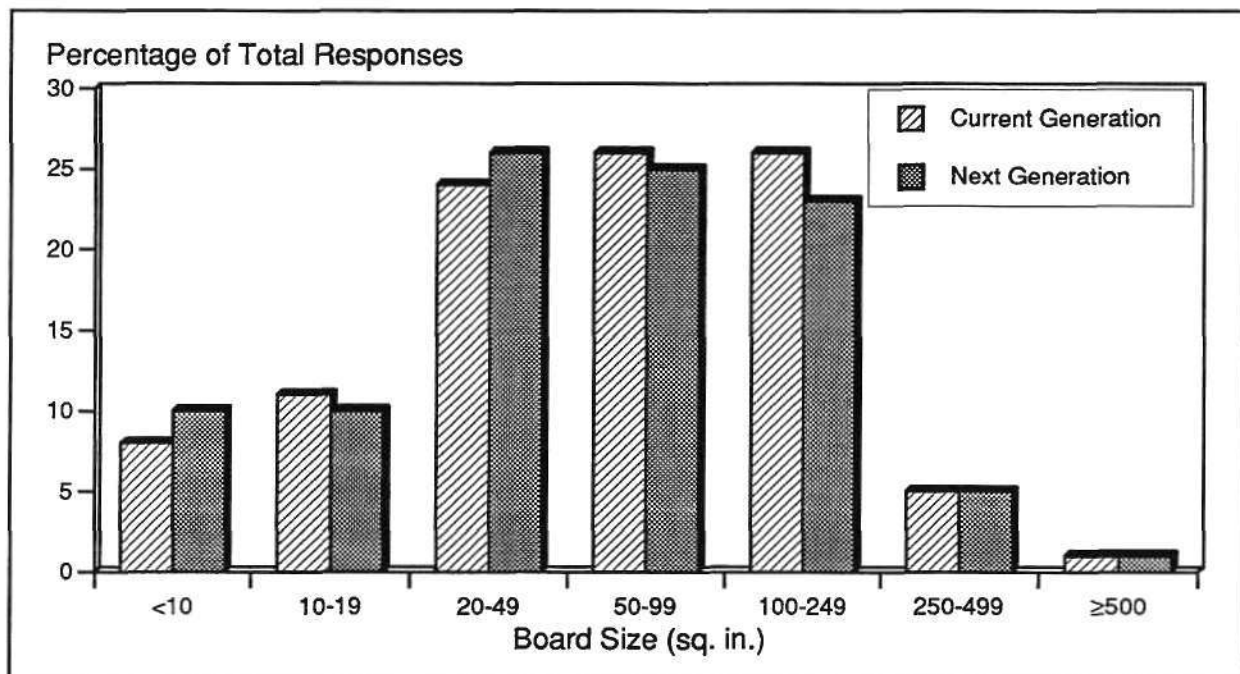
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It is a common misconception that printed circuit boards are growing smaller at a rapid rate. In fact, the results of Dataquest's research indicate that the form factors for the large majority of boards are shrinking at a much slower pace than originally anticipated. Figures 4-2, 4-3, and 4-4 show that users' responses to the size of current and next generation printed circuit boards. The average board size is anticipated to decrease only slightly during the next three to five years, with the majority of boards in the 100 to 249 square-inch range. So, while the overall size of printed circuit boards remains relatively constant, the complexity and design issues surrounding board design are increasing dramatically.

The contributing factors to board design complexity include:

- Increasing numbers of signal layers
- Increasing clock frequencies
- Device usage
- Decreasing package count
- Increasing pin counts

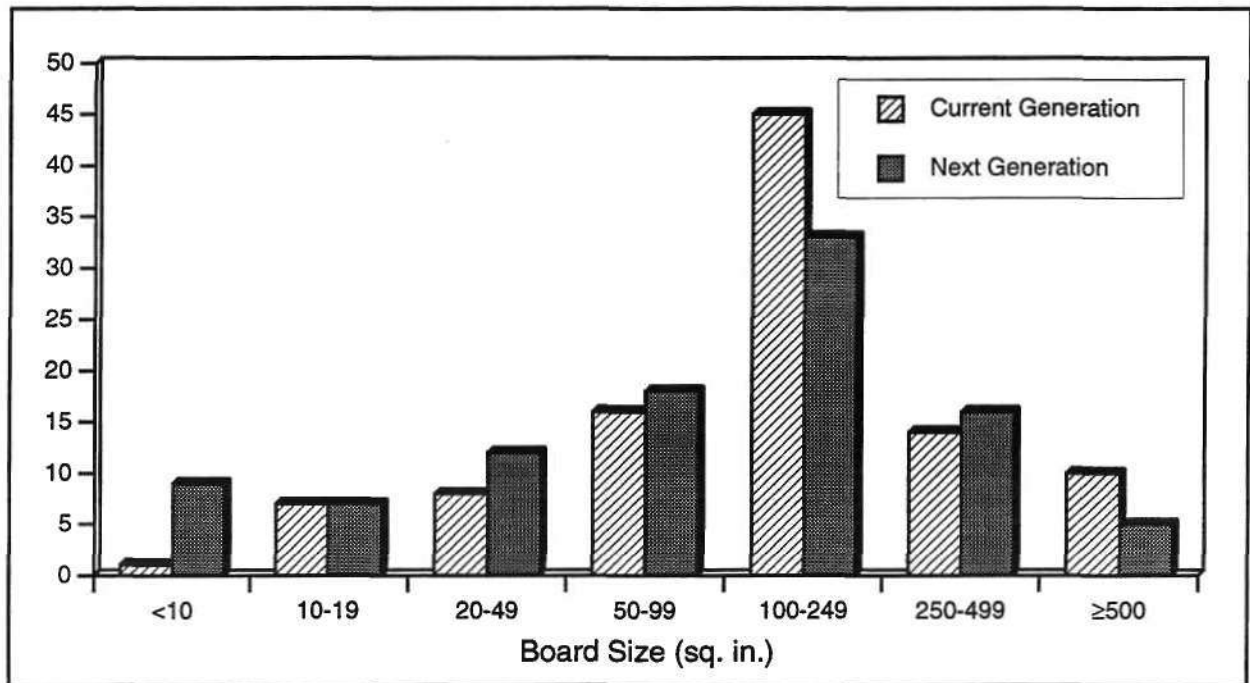
Figure 4-2
North American Board Size



Source: Dataquest (November 1992)

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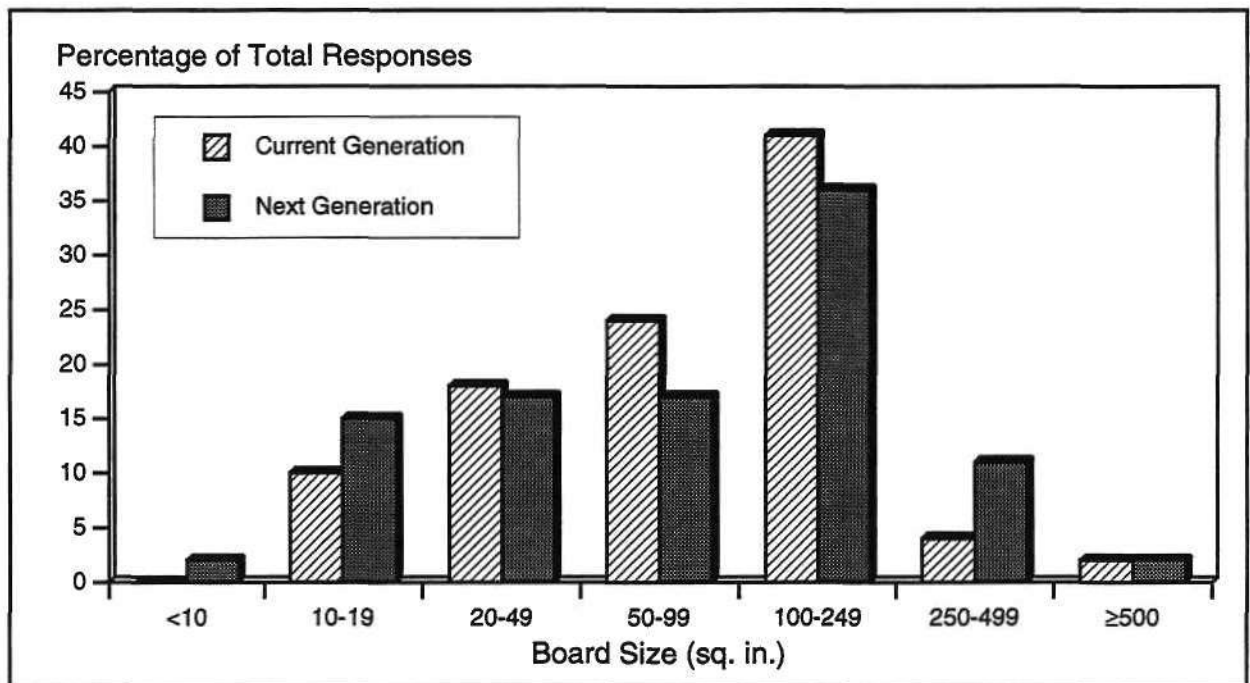
Figure 4-3
Japanese Board Size



Source: Dataquest (November 1992)

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Figure 4-4
European Board Size



Source: Dataquest (November 1992)

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Signal Layers

One way of gauging the complexity of board design is to examine the number of signal layers per board. Indeed, the number of signal layers per board are anticipated to increase 47 percent during the next five years, as shown in Figure 4-5. On average, North American designers create more complex printed circuit boards, followed by Europe, then Japan. The relative simplicity of Japanese board complexity is due to the low cost, high manufacturability needs of its consumer goods focus.

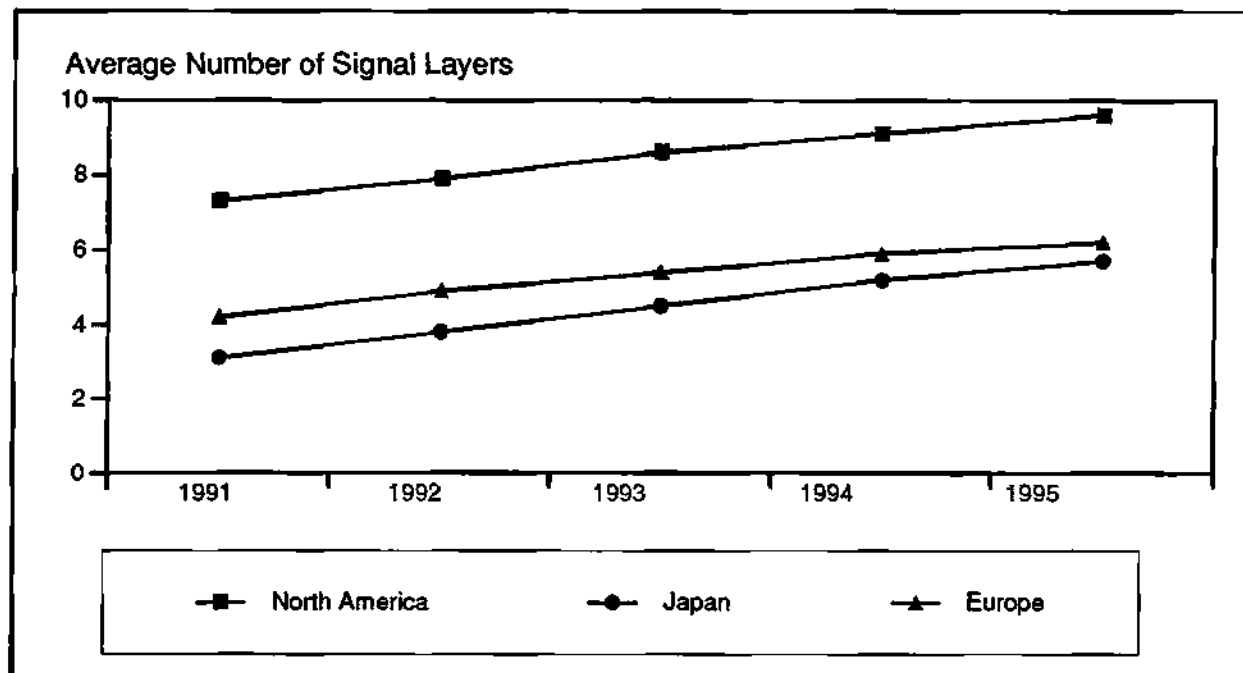
Clock Frequencies

Clock frequency is also a signpost to the complexity in board design. In 1991, the mean highest digital clock frequency of North American boards was 104 MHz. Dataquest anticipates with the coming wave of +100 MHz microprocessors, mean speeds will triple during the next few years.

Device Usage

The total number of components used per board will also decrease in the coming years. Dataquest research indicates that the average number of components per board will decrease 10 percent in North America—from a mean of 77 components today to 70 in the next generation of designs. Japanese engineers forecast a less rapid decrease in component usage, and European engineers appear to be an

Figure 4-5
Average Number of Printed Circuit Board Signal Layers



Source: Dataquest (November 1992)

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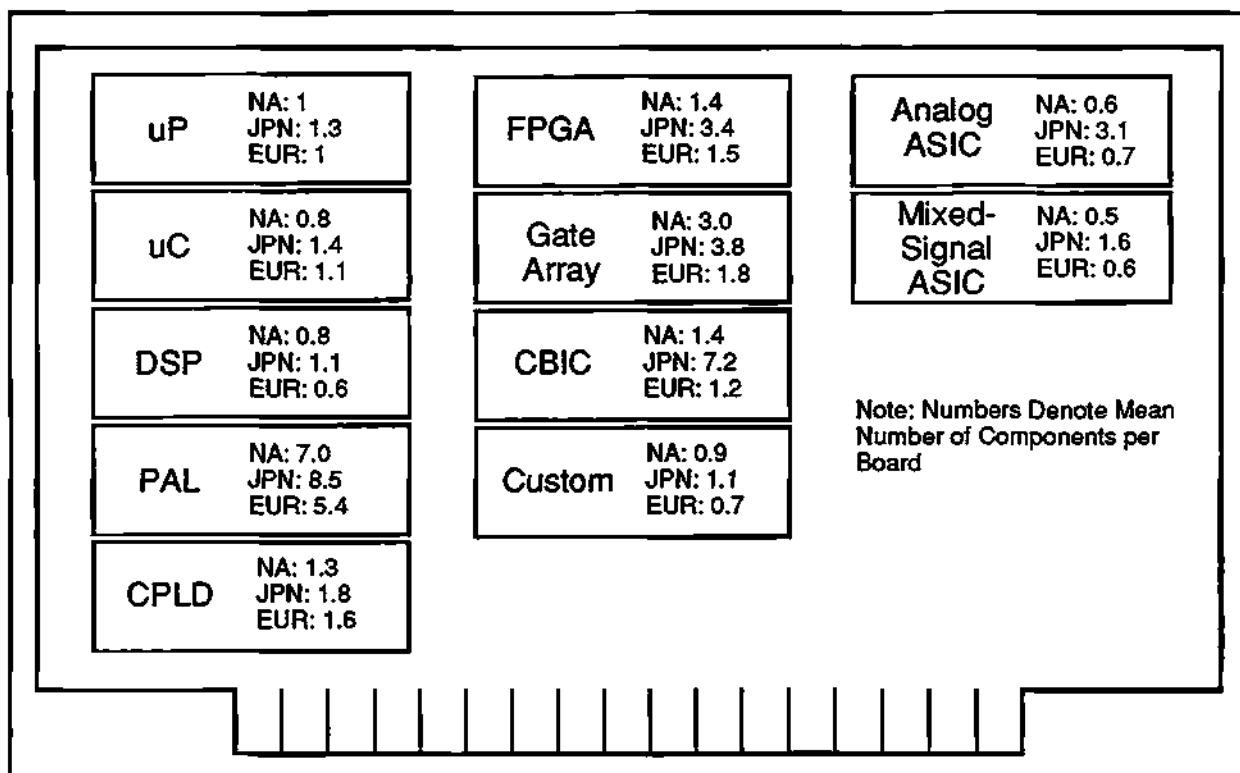
abnormality, with their mean number of components per board increasing slightly for their next generation designs.

Examining the components that make up today's printed circuit boards, we see some startling changes. While usage of standard microprocessors, ASICs, and other logic will remain relatively constant, there will be an increased usage of high-density programmable logic products, including complex programmable logic devices (CPLDs) and field-programmable gate arrays (FPGAs), as shown in Figures 4-6 and 4-7. The number of simple programmable logic devices (SPLDs) used will decrease, as these devices will be integrated into their higher capacity brethren.

Packaging

The increasing silicon capacity of microprocessors and ASIC devices has mitigated the need for increased board sizes and the need to add additional components. However, as the silicon becomes more complex, the need to increase the input and output capacity of the packages has required the development of a new breed of packaging technology.

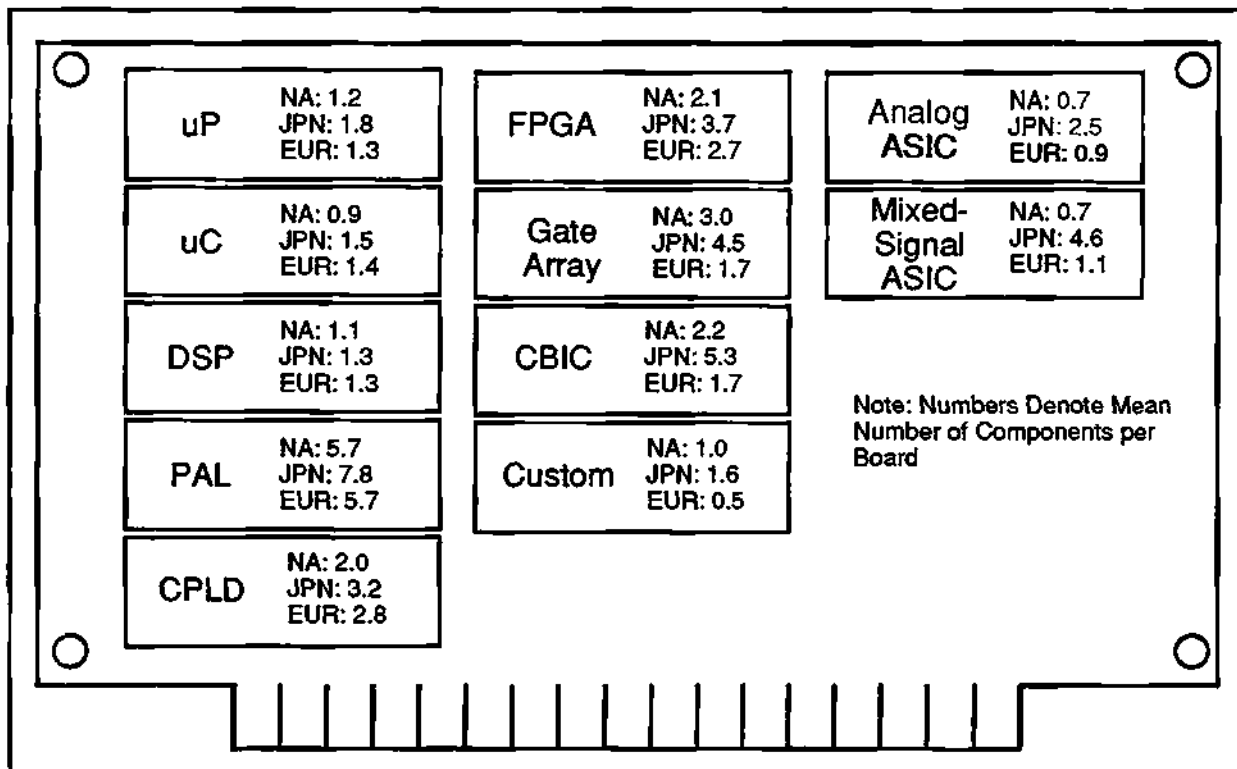
Figure 4-6
Component Makeup of Current Generation Boards



Source: Dataquest (November 1992)

G2002430

Figure 4-7
Component Makeup of Next Generation Boards



Source: Dataquest (November 1992)

G2002481

These new packaging techniques exacerbate the complexity of printed circuit board design. Electronic designers are anxious to obtain the features offered by utilizing advanced packaging techniques, including chip on board (COB), tape automated bonding (TAB), multichip modules (MCM), and flip-chip technologies. Detailed in Table 4-1 are users' responses to the types of packaging technologies that they are using, and what they plan to use for their next generation designs. Clearly, users desire the features that advanced packaging offers them, both in the increase in functionality, and the overall system speed increase. The ability to provide solutions for future packaging technologies is critical for EDA vendors that wish to participate in system level design.

Table 4-1
Usage of Advanced Packaging Technologies (Percentage of those responding)

Generation	COB (%)		TAB (%)		MCM (%)		Flip Chip (%)	
	Current	Next	Current	Next	Current	Next	Current	Next
North America	22	26	14	28	12	42	5	13
Japan	17	33	18	31	6	30	5	11
Europe	34	46	13	20	20	10	8	10

Note: All numbers are a percentage of the total responses.

Source: Dataquest (November 1992)

Chapter 5

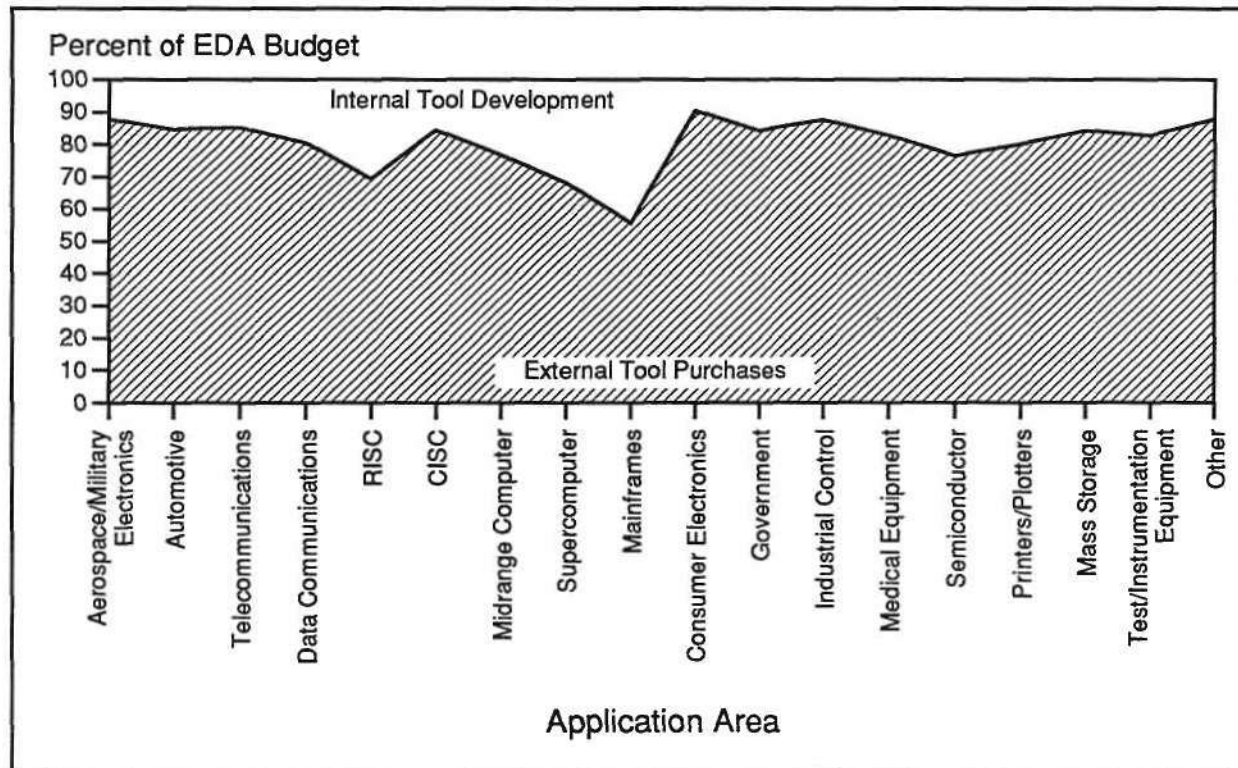
EDA Applications Perceptions ---

EDA Consumption Trends

In 1991, EDA software posted a languid 3.8 percent growth rate, and Dataquest does not forecast a recovery anytime soon. Dataquest research shows that capital equipment expenditures for EDA software are expected to increase 5 percent in North America and decrease 1 percent in Europe. The smallest amount of growth in the history of EDA software occurred in 1991. Is this slowdown in the historically high-growth rates in EDA software a signpost of the maturation—or perhaps saturation—of electronic design automation? While many factors contributed to the recent lackluster performance, including product transitions, global economic recession, and political instability, examining the perceptions of electronic designers toward EDA software will shed some light on future growth opportunities. To accurately gauge market perception and possible saturation of EDA applications, Dataquest asked end users about their feelings towards EDA tools, and the need for additional licenses.

Many factors contributed to the high-growth rates in EDA software in the past, including the introduction of new applications and the adoption of ASICs as a design methodology. The shift from proprietary tools, supplied by ASIC vendors or developed internally, to using commercially available external tools was extremely important. Commercial EDA vendors benefited, as large companies shifted from spending their EDA budgets on internally developed tools to purchasing external tools. However, Dataquest research indicates that this shift is almost at an end. We asked electronic designers what percentage of their EDA budgets spent on external tools versus developing internal tools. The results are shown in Figures 5-1, 5-2, and 5-3. Worldwide, approximately 85 percent of EDA budgets were spent on external tools. The other 15 percent was spent on internal development, including applications not commercially available, systems integration, and support. Dataquest believes that there is an opportunity for large EDA suppliers to garner some of this last 15 percent of EDA dollars by providing custom consulting and integration services to large design groups.

Figure 5-1
Percentage of EDA Budget Spent on External Tools, North America



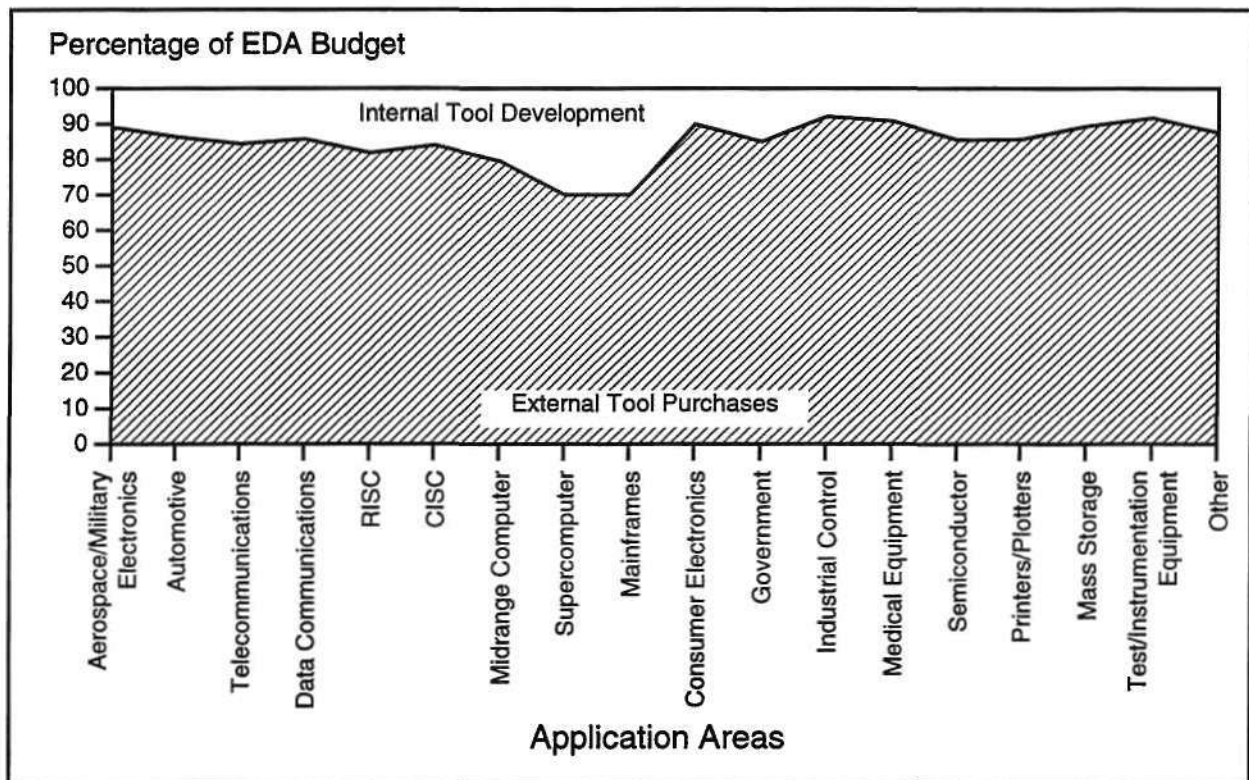
Source: Dataquest (November 1992)

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Design Entry: The Workhorse

The need to capture electronic design information is more crucial today than it ever has been in the past. With the increasing complexity and shortening design cycles, designers are looking toward this area to improve their productivity. To gauge the relative importance of design tools, Dataquest asked electronic designers to rate (on a scale from one to five) the importance of a variety of tools. Schematic capture continues to have a strong significance to the electronic designer, as shown in Figure 5-4. Indeed, schematic capture is the most ubiquitous EDA application, with an average of 45 licenses per company in North America. However, as is readily apparent in Figures 5-5 and 5-6, there does not seem to be a need for additional licenses. True schematic capture is a mature market, and is slowly being superseded by hardware description language (HDL)-based entry. While not of primary importance to the electronic designer today, with a mean rating of 3.7, there is a pent-up demand for HDL-based entry products.

Figure 5-2
Percentage of EDA Budget Spent on External Tools, Europe



Source: Dataquest (November 1992)

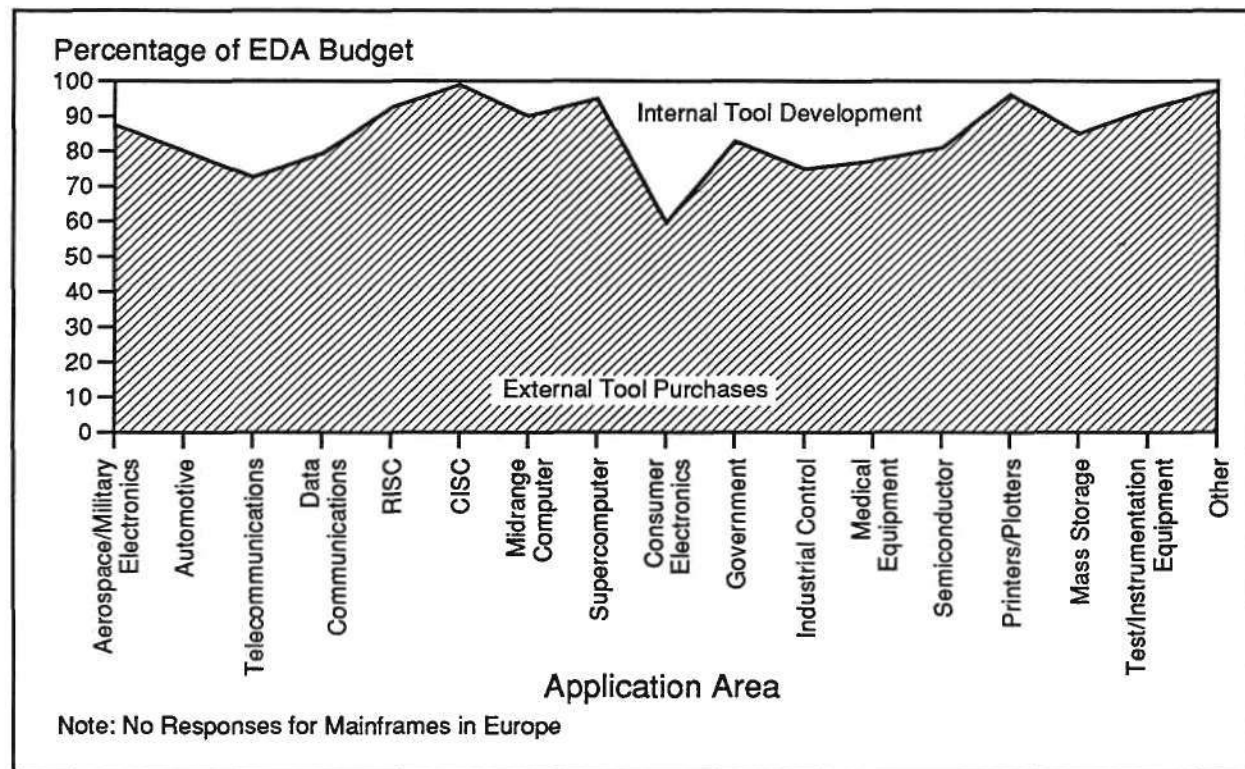
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Model libraries consistently rank as an important tool in the design automation process. The libraries are the foundations upon which the rest of the EDA tools work, and users clearly recognize the importance of having quality models. Dataquest anticipates that both users and EDA vendors will place continued focus upon the model problem.

Design Verification

Design verification tools are the most important weapons the electronic designer has to combat design problems. Design simulation ranks as the single most important tool across every geographic area and industry. Not surprisingly, there are a variety of additional tools being provided by EDA vendors to help in the design verification process. However, only static timing analysis appears to be a crucial tool in the designers' arsenal, as shown in Figure 5-7. Japanese designers, in particular, rate design verification tools higher than their North American and European counterparts—a telltale sign of the Japanese focus of detailed analysis. As with all highly rated tools, however, there is not a significant demand to add more simulation tools. As shown in Figure 5-7, only Europe has a need to significantly increase the number of logic simulation licenses.

Figure 5-3
Percentage of EDA Budget Spent on External Tools, Japan



Source: Dataquest (November 1992)

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Test Automation

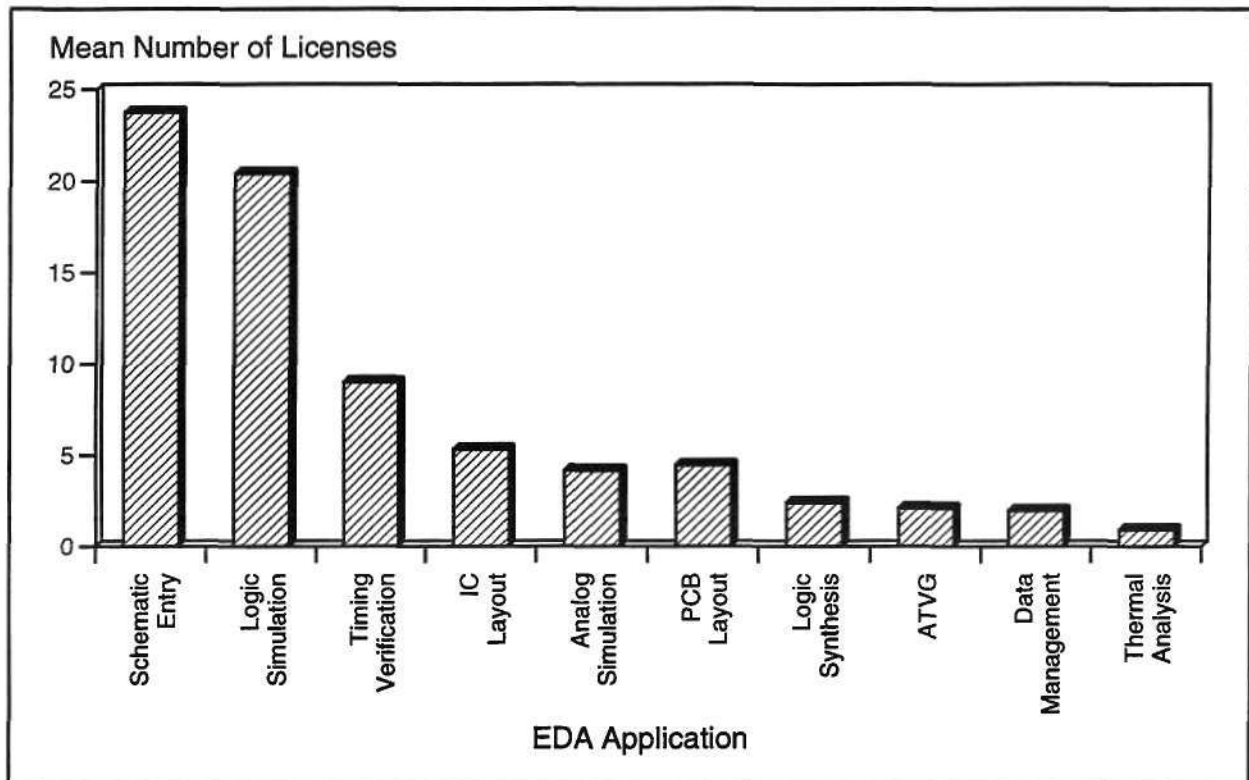
Figure 5-8 shows that North American designers appear to have missed the significance of test automation tools. Japanese and European designers rate these tools 0.4 higher (on average) than North American designers. Dataquest believes that this is a result of the increased pressure for quality and reliability placed upon these design groups, particularly in Japan. As such, these designer rank the importance of test automation tools higher.

Automatic test vector generation (ATVG) appears to have a bright future, as the demand for additional ATVG licenses is significant. This demand must be tempered with the small current installed base, shown in Figure 5-8. The average number of ATVG licenses is small in comparison to other tools, and the prohibitive cost may limit potential growth. Additionally, the emergence of test logic synthesis, which is ranked higher in importance in designers' minds, may mitigate the need for sophisticated test pattern generation tools.

Frameworks and Infrastructure

During the past three years, the framework message has been broadcast far and wide. Indeed, the idea that frameworks are the panacea to the myriad of inter-tool difficulties has been oversold. Users seem

Figure 5-4
Worldwide Mean Number of Users' Current Licenses



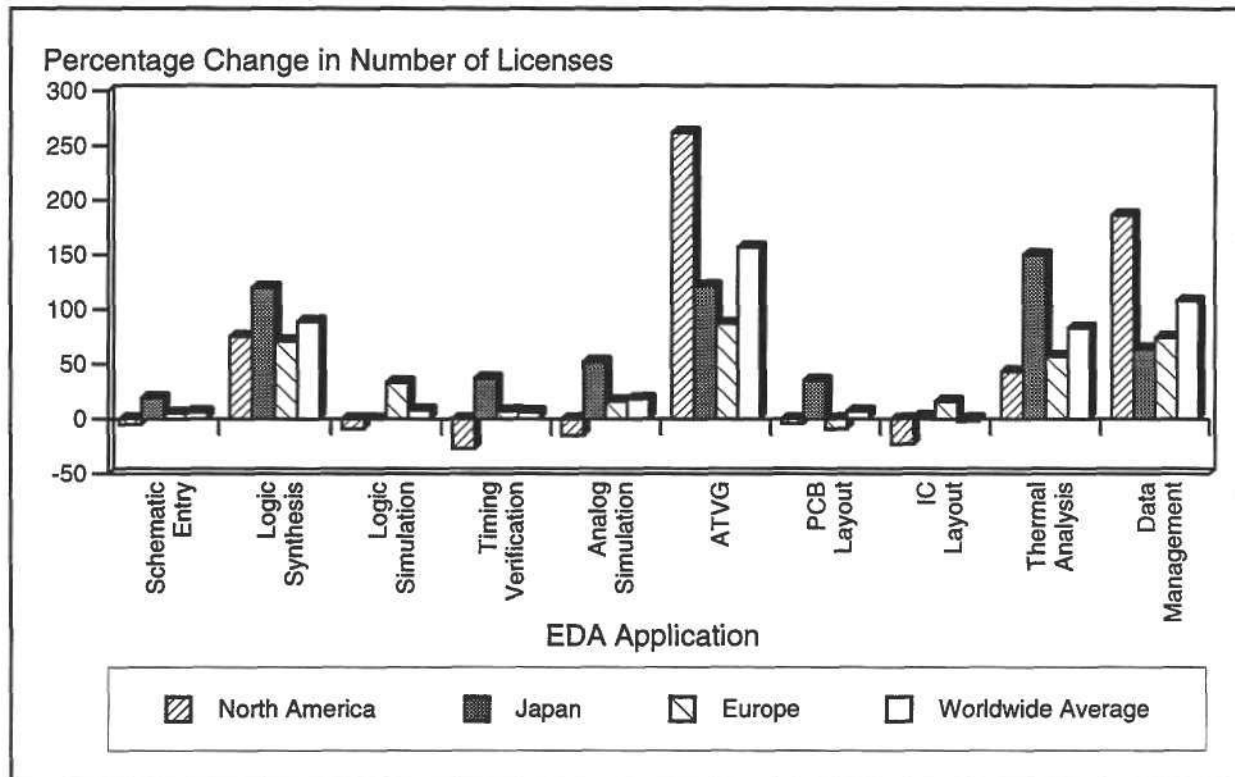
Source: Dataquest (November 1992)

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reluctant to place much faith in these highly touted beasts, and rank tools such as data management, documentation, and manufacturing interfaces low in comparison to traditional point tools, as shown in Figure 5-9.

Despite this relatively poor showing, Dataquest believes that framework technology will be an integral part of the future of electronic design. EDA vendors have proceeded down a path of no return, offering designers a glimpse of an idyllic world where they may pick and choose point tools to construct their design methodologies. Yet, large EDA vendors will have to supply frameworks to the electronic designer at a very low price premium. Dataquest asked electronic designers what they would be willing to pay for features offered in today's frameworks. As shown in Figures 5-10, 5-11, and 5-12, the net result is that electronic designers are willing to pay little for the promised benefits of frameworks. One must be wary of the survey technique used in this particular case, as most designer would tend to respond with a low value. While the data may be skewed to the downside, the relative perceived value and importance rating combined should make the EDA vendor wary of trying to extract a premium for their framework technology. Rather, Dataquest believes the frameworks and framework technology should be a leveragable technology, used by the EDA vendor to integrate point tools and to provide solutions to the electronic designer.

Figure 5-5
Difference between Number of Licenses Owned versus Number Needed,
by Application



Source: Dataquest (November 1992)

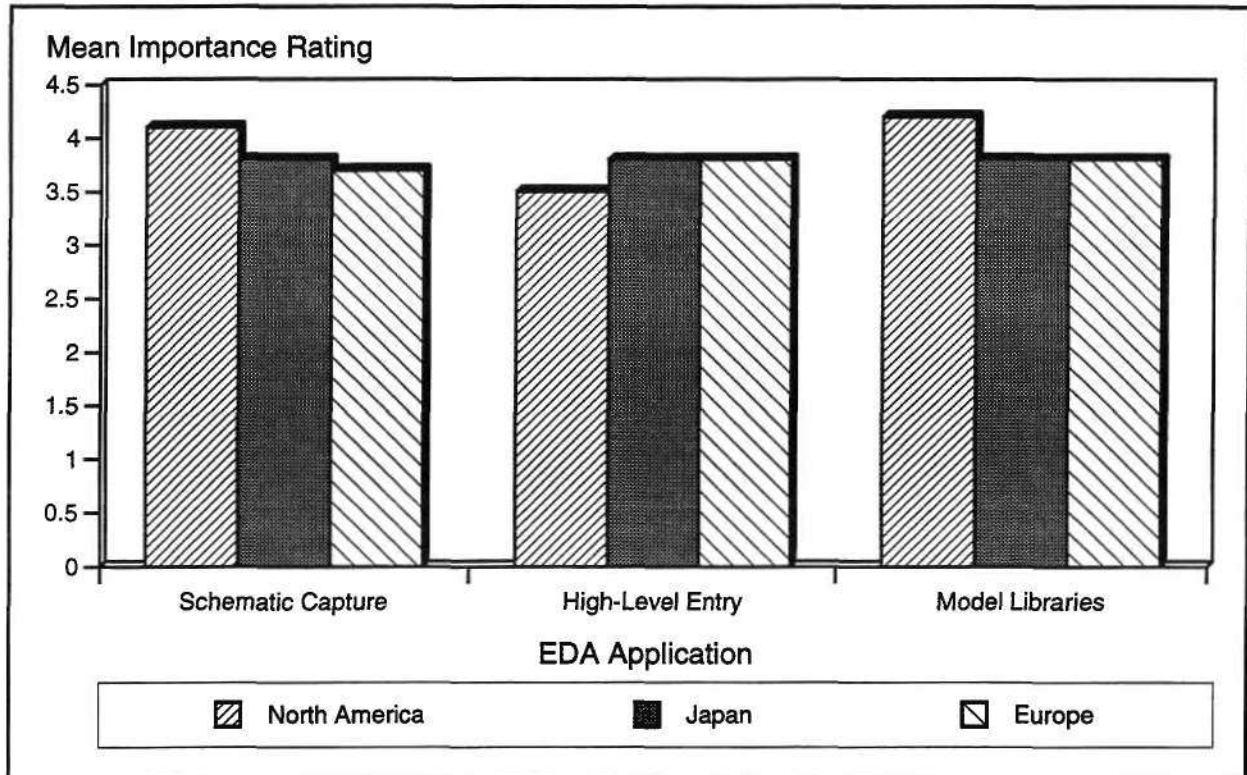
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User-interface customization is not perceived as being a significant value-added feature to electronic designers. Indeed, 76 percent of electronic designers worldwide would not pay more than \$5,000 per seat for this ability. Contrary to the monetary value given this ability by designers, Dataquest believes that common user interfaces will be widely accepted and Motif will continue to gain acceptance.

Tool integration and data translation capabilities are perceived to have more value to designers. Dataquest believes that this capability will be increasingly important to large EDA vendors as they begin to adopt third-party tools into their standard offerings. One of the more widely recognized standards used for data translation is the Electronic Design Interchange Format (EDIF). Shown in Table 5-1 are the percentages of people currently using and planning to use EDIF for a variety of tasks. While no standard is perfect, and EDIF has had its detractors, overall usage of the standard remains strong and is growing.

Data and Library Management has one of the greatest benefits to systems designers in the coming years: the ability to store, reuse, and modify existing libraries of components or designs. This advantage will become increasingly more important as complexity increases. In particular, ASIC design has the most glaring need for this capability.

Figure 5-6
Mean Importance Rating of Design Entry Tools



Source: Dataquest (November 1992)

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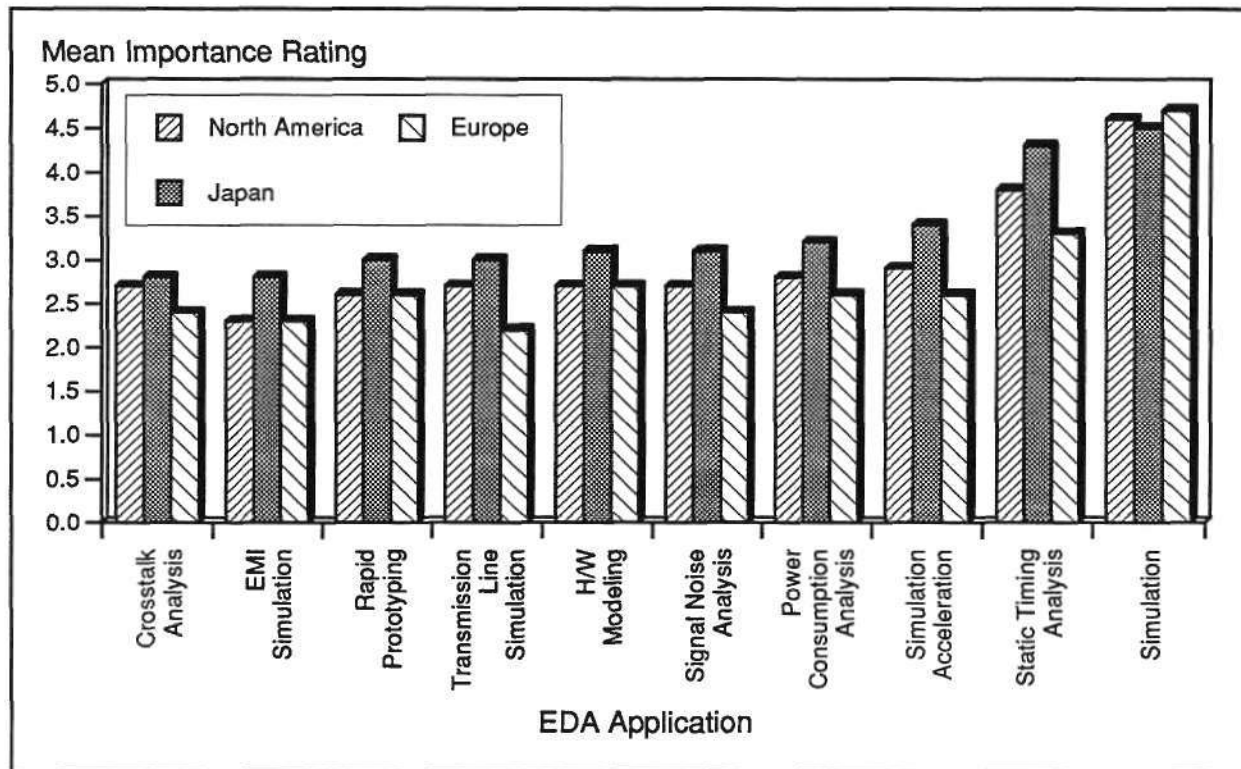
Today, the average design reuses 35 percent of the previous design. As ASIC silicon capacity continues to skyrocket, Dataquest believes that this reuse factor will begin to approach 50 percent to take full advantage of the ASIC capacity.

Synthesis and Layout

Usage of logic synthesis tools has shown marked growth in the past three years. From when synthesis was commercially introduced in 1989, the average design group now has more than two licenses. Judging by the need for additional licenses, the future of synthesis tools is exceptionally bright. On average, the number of licenses is expected to increase more than 50 percent during the next five years.

In contrast, the demand for additional licenses of PCB and IC layout tools is small. Figure 5-5 shows PCB and IC Layout tool licenses are not expected to increase during the next several years. Yet the mean number of licenses of layout tools is effectively twice that of synthesis tools, and the replacement market for PCB and IC layout tools will remain strong. Indeed, electronic designers consistently give PCB and IC layout a high importance rating, as shown previously in Figure 5-9.

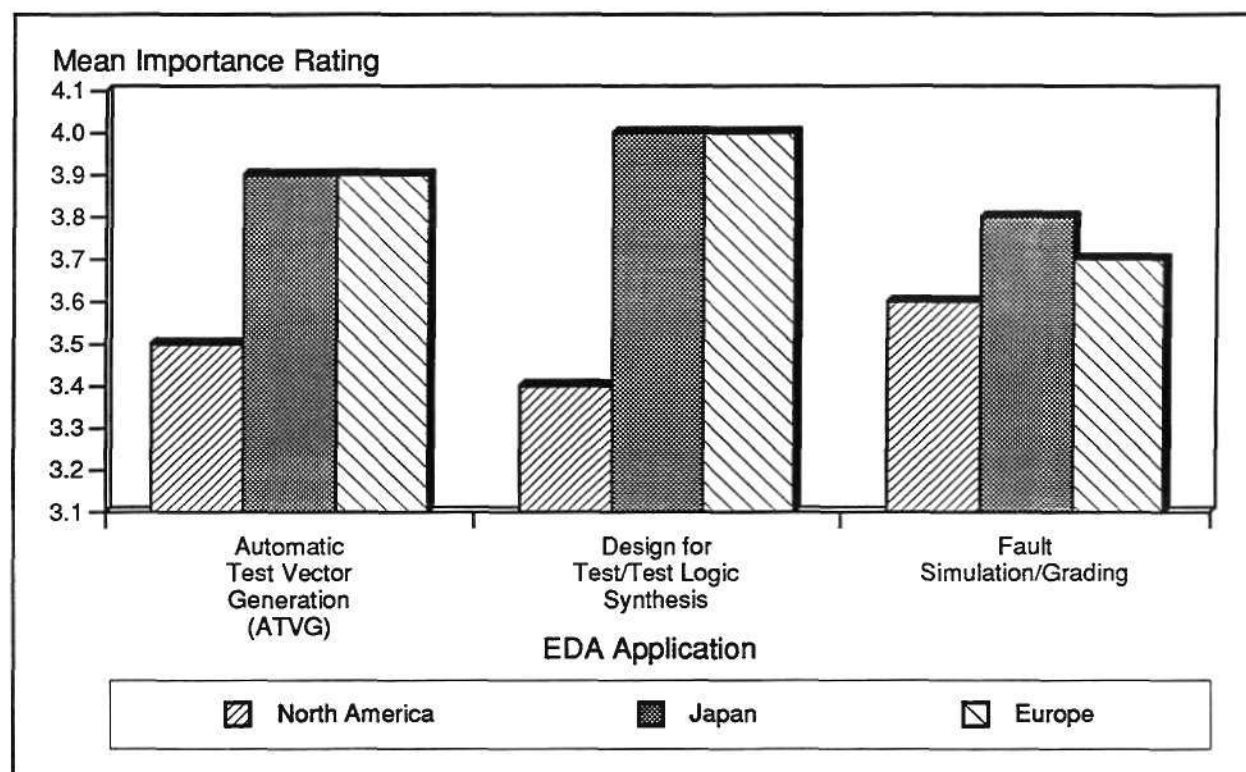
Figure 5-7
Mean Importance Ranking of Design Verification Tools



Source: Dataquest (November 1992)

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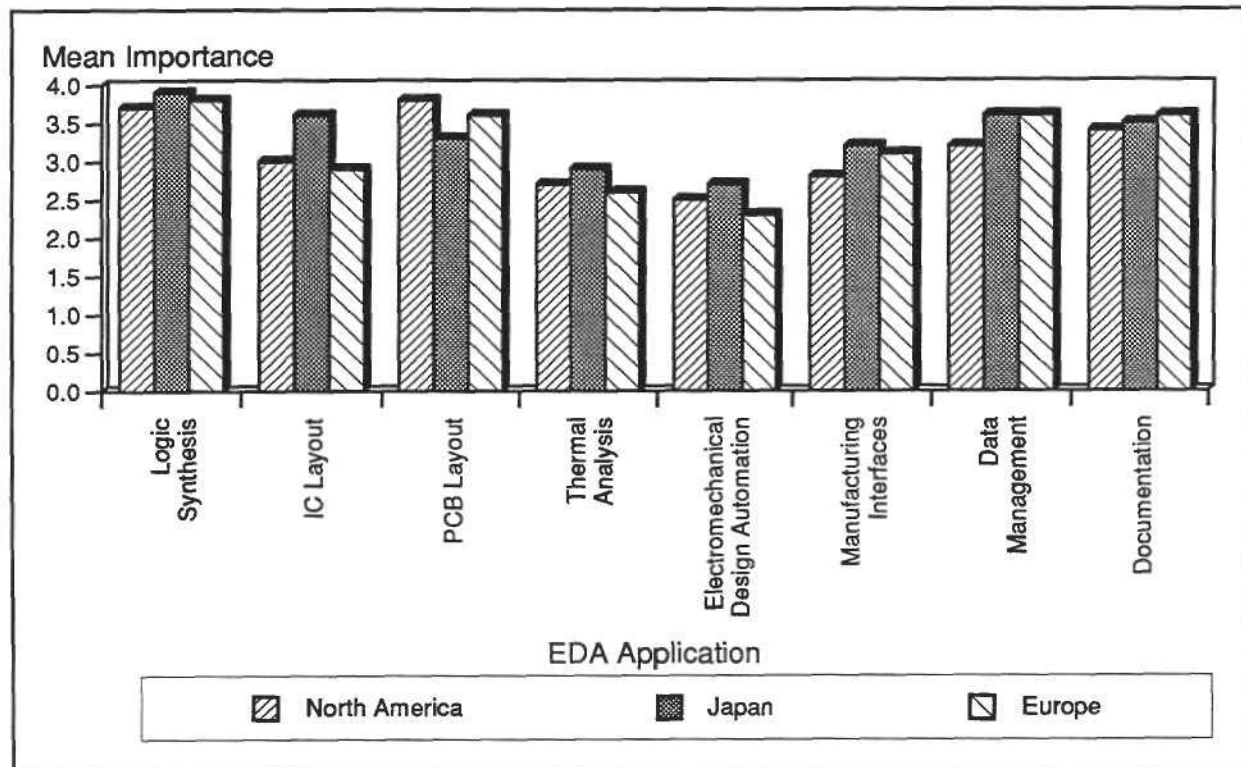
Figure 5-8
Mean Importance Rating of Test Automation Tools



Source: Dataquest (November 1992)

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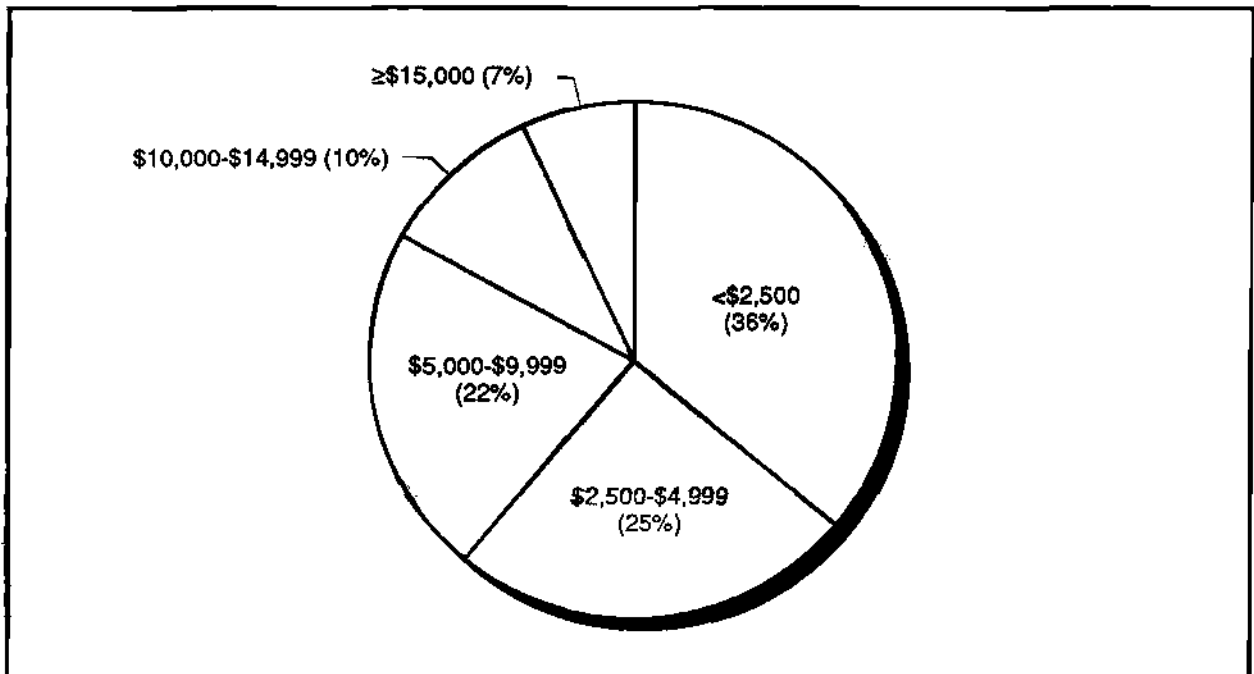
Figure 5-9
Mean Importance Rating of Selected EDA Applications



Source: Dataquest (November 1992)

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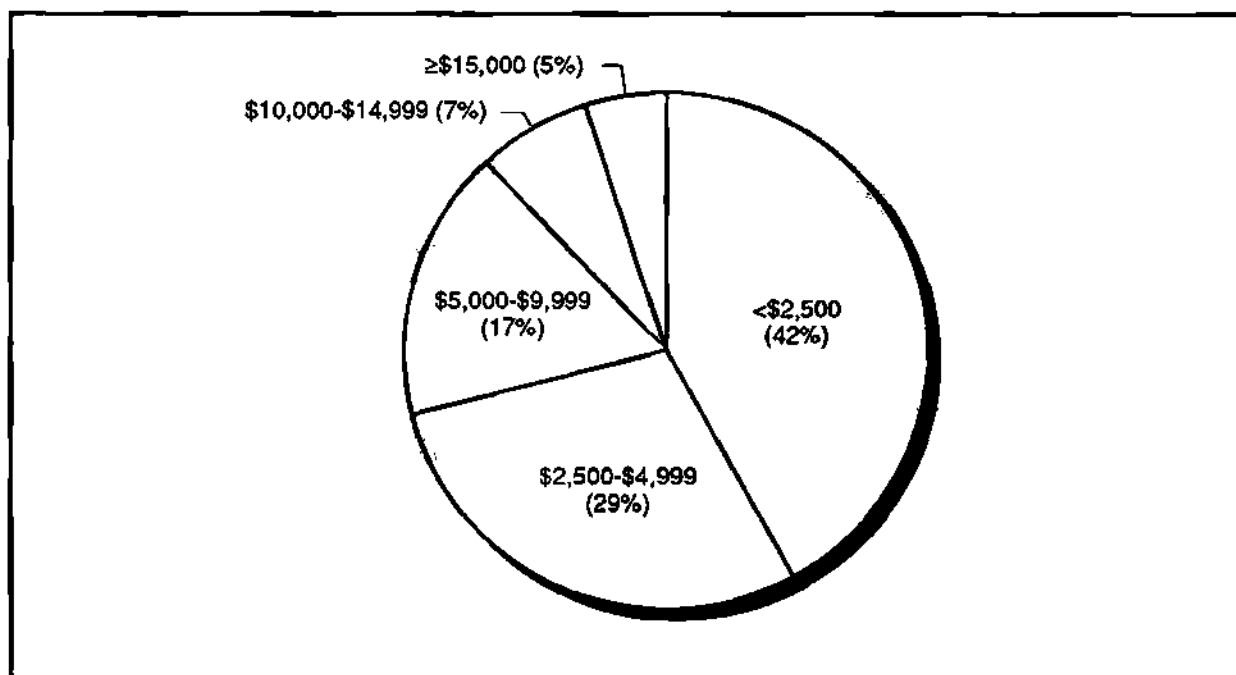
Figure 5-10
Willingness to Pay per Seat for Framework License Offering
Tool Integration and Data Translation



Source: Dataquest (November 1992)

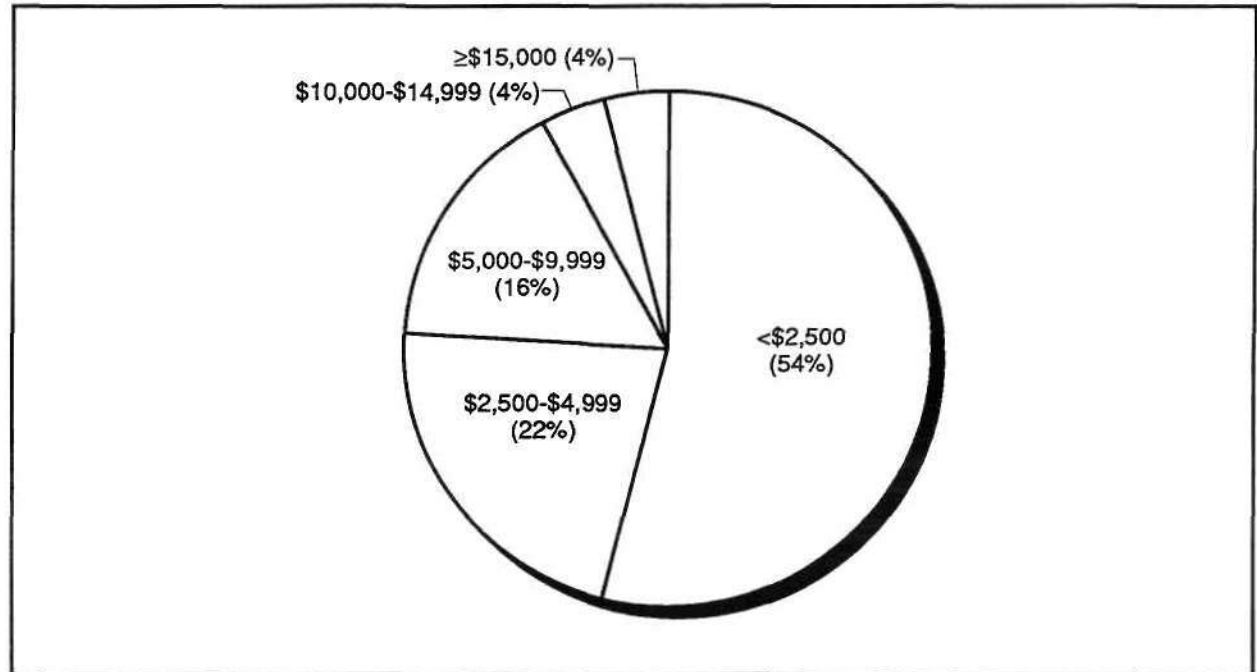
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Figure 5-11
Willingness to Pay per Seat for Framework License Offering
User Interface Customization



Source: Dataquest (November 1992)

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Figure 5-12**Willingness to Pay per Seat for Framework License Offering Data and Library Management**

Source: Dataquest (November 1992)

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Table 5-1**Usage of EDIF (Percentage of those Responding)**

Generation	Design Data Translation (%)		Library Data (%)		Other (%)	
	Current	Next	Current	Next	Current	Next
North America	40	46	20	31	2	3
Japan	33	57	15	45	0	0
Europe	51	51	31	42	5	7

Note: All numbers are a percentage of the total responses.

Source: Dataquest (November 1992)

Appendix A

Dataquest Electronic Design Survey

Dataquest Electronic Design Survey

1. Please check the organization for which you will be responding in answering this survey (check only one):

Company ☐

Project Team ☐

2. What is the average size of your ASIC designs (in gates)?

	<u>Current Design*</u> (check one)	<u>Next Generation Design</u> (check one)
4,999 or fewer	<input type="checkbox"/>	<input type="checkbox"/>
5,000—9,999	<input type="checkbox"/>	<input type="checkbox"/>
10,000—19,999	<input type="checkbox"/>	<input type="checkbox"/>
20,000—49,999	<input type="checkbox"/>	<input type="checkbox"/>
50,000—74,999	<input type="checkbox"/>	<input type="checkbox"/>
75,000—99,999	<input type="checkbox"/>	<input type="checkbox"/>
100,000 and greater	<input type="checkbox"/>	<input type="checkbox"/>
Don't know	<input type="checkbox"/>	<input type="checkbox"/>

*Current design means the design that you are currently working on. This usage is consistent throughout this survey.

3. Please estimate the average annual unit volume production per board design: _____

4. What is the average number of signal layers per board design?

Current Design _____

Next Generation Design _____

5. What is the size of your typical board design?

	<u>Current Design</u> (Check one)	<u>Next Generation Design</u> (Check one)
Less than 10 square inches (25.4 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>
10-19 square inches (25.4-50.7 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>
20-49 square inches (50.8-126.9 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>
50-99 square inches (127-253.9 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>
100-249 square inches (254-634.9 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>
250-499 square inches (635-1,269.9 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>
500 square inches or greater (1,270 cm ²)	<input type="checkbox"/>	<input type="checkbox"/>

6. How many different boards does your company and project team design annually?

Company _____

Project Team _____

7. Please estimate the average number of IC packages per typical board design:

Current Design _____

Next Generation Design _____

8. What is the highest frequency used in your design?

Digital Clock Frequency _____ MHz

Analog Signal Frequency _____ MHz

9. What percentage of your design's functionality is reused circuitry from a previous design? _____ %

10. Are you using, or do you plan to use, EDIF in your design process for the following (check all that apply)?

	<u>Current Design</u>	<u>Next Generation Design</u>
Design Data Translation	<input type="checkbox"/>	<input type="checkbox"/>
Library Data Translation	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	_____	_____

11. On average, how many of the following devices do/will you have on each board design?

	<u>Current Design</u>	<u>Next Generation Design</u>
Microprocessors	_____	_____
Microcontrollers	_____	_____
DSPs	_____	_____
PALs, PLAs	_____	_____
Complex PLDs (e.g., Altera's MAX, Plus Logic)	_____	_____
Field Programmable Gate Arrays (e.g., Xilinx, Actel ICs)	_____	_____
Gate Arrays (Mask Programmable)	_____	_____
Cell-Based ICs	_____	_____
Handcrafted, Full-Custom ICs	_____	_____
Analog ASICs	_____	_____
Mixed Signal ASICs	_____	_____

12. Please check the process technologies of the standard ICs and ASICs used in your board design (check all that apply):

	<u>Standard ICs</u>		<u>ASICs</u>	
	<u>Current Design</u>	<u>Next Generation Design</u>	<u>Current Design</u>	<u>Next Generation Design</u>
NMOS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
CMOS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BiCMOS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TTL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ECL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GaAs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Don't Know	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	_____ (Specify)		_____ (Specify)	

13. a) For a typical electronic system design project, how many total engineers are assigned? _____
 b) Of the total engineers, which of the following categories apply (check as many as applicable)?

System Architects	<input type="checkbox"/>	PCB Layout Specialists	<input type="checkbox"/>
Digital Designers	<input type="checkbox"/>	IC Layout Specialists	<input type="checkbox"/>
Analog Designers	<input type="checkbox"/>	Software Development Engineers	<input type="checkbox"/>
Mixed-Signal Designers	<input type="checkbox"/>	Packaging Engineers	<input type="checkbox"/>
Simulation and Verification Support Engineers	<input type="checkbox"/>	Reliability Engineers	<input type="checkbox"/>
Test Engineers	<input type="checkbox"/>	Manufacturing Engineers	<input type="checkbox"/>
Other (please specify) _____			

14. Please estimate the number of licenses/copies of the following EDA tools that you have, and how many you need:

	Currently Have	Currently Need
Schematic Entry	_____	_____
Logic Synthesis	_____	_____
Logic Simulation	_____	_____
Timing Verification	_____	_____
Analog Simulation	_____	_____
Automatic Test Vector Generation	_____	_____
PCB Layout	_____	_____
IC Layout	_____	_____
Thermal Analysis	_____	_____
Data Management	_____	_____

15. Please check the three most important factors to your product's future ability to achieve market success (check only three):

Increasing Functionality	<input type="checkbox"/>
Increasing System Speed	<input type="checkbox"/>
Increasing Quality/Reliability	<input type="checkbox"/>
Increasing Ease of Use	<input type="checkbox"/>
Reducing Time-to-Market	<input type="checkbox"/>
Reducing Form Factor	<input type="checkbox"/>
Reducing Cost	<input type="checkbox"/>
Reducing Power Dissipation	<input type="checkbox"/>
Reducing EMI	<input type="checkbox"/>
Other (please specify) _____	

16. Please estimate the percentage investment (i.e., resources) in developing the hardware portion of your system versus the software portion:

	<u>Current Design</u>	<u>Next Generation Design</u>
Hardware Portion _____		
Software Portion _____		
Total = 100%		Total = 100%

17. If you use or plan to use the following devices, what do you plan to use them for (check all that apply)?

	<u>Prototyping</u>	<u>Production</u>	<u>ASIC Emulation</u>
PALs, PLAs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Complex PLDs/FPGAs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

18. For a typical board design, what percentage of its functionality is digital versus analog?

	<u>Current Design</u>	<u>Next Generation Design</u>
Digital	_____	_____
Analog	_____	_____
Total = 100%		Total = 100%

19. Please estimate the percentage of the packages on your current board design according to the following categories:

Surface Mount _____	
Through-Hole Packages _____	
Total = 100%	

20. Which of the following package technologies do you currently use or are you planning to use (check all that apply)?

	<u>Current Design</u>	<u>Next Generation Design</u>
Chip on Board (CoB)	<input type="checkbox"/>	<input type="checkbox"/>
Tape Automated Bonding (TAB)	<input type="checkbox"/>	<input type="checkbox"/>
Multi Chip Modules (MCM)	<input type="checkbox"/>	<input type="checkbox"/>
Flip Chip	<input type="checkbox"/>	<input type="checkbox"/>
Hybrid	<input type="checkbox"/>	<input type="checkbox"/>

21. For your board designs, how long (in months) would you estimate the design cycle to be?

	<u>Current Design</u>	<u>Board Designs</u>	<u>Next Generation Design</u>
From concept to prototype	_____		_____
From prototype to volume production	_____		_____

22. For your ASIC designs, how long (in months) would you estimate the design cycle to be?

	<u>Current Design</u>	<u>ASIC Designs</u>	<u>Next Generation Design</u>
From concept to prototype	_____		_____
From prototype to volume production	_____		_____

23. What percentage of fault coverage is acceptable in your ASIC designs (check only one)?

Less than 50%	<input type="checkbox"/>
50-79%	<input type="checkbox"/>
80-85%	<input type="checkbox"/>
86-90%	<input type="checkbox"/>
91-95%	<input type="checkbox"/>
96-99%	<input type="checkbox"/>
100%	<input type="checkbox"/>

24. In order for your ASIC design to achieve the highest possible testability level acceptable, what percentage of increased component cost and reduced speed are you willing to accept?

<u>Penalty</u>	0	1-5%	6-10%	11-15%	16-20%	>20%
Component cost (Check one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reduced speed (Check one)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25. Please indicate whether any of your designs implement the following test capabilities (check all that apply):

	<u>Current Design</u>	<u>Next Generation Design</u>
Full SCAN (ASIC)	<input type="checkbox"/>	<input type="checkbox"/>
Partial SCAN (ASIC)	<input type="checkbox"/>	<input type="checkbox"/>
BIST (ASIC)	<input type="checkbox"/>	<input type="checkbox"/>
BIST (board)	<input type="checkbox"/>	<input type="checkbox"/>
JTAG (board)	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	_____	_____

26. a) During the design cycle, which of the following design problems consumes more time?

	<u>ASIC Design</u> (Check One)	<u>Board Design</u> (Check One)
Timing violations	<input type="checkbox"/>	<input type="checkbox"/>
Functional violations	<input type="checkbox"/>	<input type="checkbox"/>

- b) After the prototype is received, which of the following design problems consumes more time?

	<u>ASIC Design</u> (Check One)	<u>Board Design</u> (Check One)
Timing violations	<input type="checkbox"/>	<input type="checkbox"/>
Functional violations	<input type="checkbox"/>	<input type="checkbox"/>

27. Please indicate the percentage of system design cycle time spent on the following tasks:

% of System Design
Cycle Time Spent on Task

Definition of design specification and system partitioning
 Logic/circuit design and logic verification
 Design for testability and test vector development
 System integration and verification
 Prototype debug
 Other (please specify)
 Total = 100%

28. During the design cycle, what methods do you use to verify your system designs (check all that apply)?

	<u>Current Design</u>	<u>Next Generation Design</u>
Full system level simulation	<input type="checkbox"/>	<input type="checkbox"/>
Simulate critical parts only	<input type="checkbox"/>	<input type="checkbox"/>
Breadboard (or directly to prototype)	<input type="checkbox"/>	<input type="checkbox"/>

29. a) What is your EDA budget (in dollars if possible)?

1991
 1992 (estimate)

- b) What percentage of your 1991 EDA budget is spent on purchasing tools from outside vendors versus *developing* tools internally?

Outside Vendors %
 Internal Development %
 Total = 100%

30. On a per-seat basis, how much would you be willing to spend for a framework license that supports the following (check only one per column)?

	<u>Tool Integration & Data Translation</u>	<u>Data & Library Management</u>	<u>User Interface Customization</u>
Less than \$2,500	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$2,500-\$4,999	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$5,000-\$9,999	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$10,000-\$14,999	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$15,000 or more	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

31. From the following list, please check all the vendors whose platforms you currently use or plan to use for EDA:

	<u>Current</u>	<u>Future</u>
Apple Computer	<input type="checkbox"/>	<input type="checkbox"/>
DEC	<input type="checkbox"/>	<input type="checkbox"/>
Fujitsu	<input type="checkbox"/>	<input type="checkbox"/>
HP/Apollo	<input type="checkbox"/>	<input type="checkbox"/>
Hitachi	<input type="checkbox"/>	<input type="checkbox"/>
IBM	<input type="checkbox"/>	<input type="checkbox"/>
MIPS	<input type="checkbox"/>	<input type="checkbox"/>
NEC	<input type="checkbox"/>	<input type="checkbox"/>
Silicon Graphics	<input type="checkbox"/>	<input type="checkbox"/>
Sony	<input type="checkbox"/>	<input type="checkbox"/>
Sun Microsystems	<input type="checkbox"/>	<input type="checkbox"/>
IBM Clone Vendor	<input type="checkbox"/>	<input type="checkbox"/>
SPARC Clone Vendor	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>

32. Do you plan to use X terminals that do not provide any local processing power in your EDA environment?

Yes ☐
No ☐

33. Please rate the importance of each of the following design automation tools (rate on a scale of 1 to 5, with 1 = Least Important and 5 = Most Important):

	Least Important	1	2	3	4	Most Important
DIGITAL DESIGN						
Design Entry:						
Schematic entry (graphical)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
High level entry (e.g., HDL)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Model libraries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design Verification:						
Simulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Static timing verification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Signal noise analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transmission line simulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crosstalk analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power consumption analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EMI simulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Simulation acceleration (e.g., Zycad, IKOS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hardware modeling (e.g., Logic Modeling Systems)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rapid prototyping (e.g., ASIC emulators)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logic Synthesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Test Automation:						
Automatic test vector generation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Design for testability/test logic synthesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fault simulation/grading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OTHER						
IC Layout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PCB Layout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermal Analysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electromechanical Design Automation Tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Manufacturing Interfaces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

34. Which of the following design and manufacturing tasks do you currently perform, or will you perform, internally within your company (check all that apply):

	<u>Current Design</u>	<u>Next Generation Design</u>
IC floor planning	<input type="checkbox"/>	<input type="checkbox"/>
IC manual place and route	<input type="checkbox"/>	<input type="checkbox"/>
IC automatic place and route	<input type="checkbox"/>	<input type="checkbox"/>
IC design rule checking	<input type="checkbox"/>	<input type="checkbox"/>
IC electrical rule checking	<input type="checkbox"/>	<input type="checkbox"/>
IC logic-to-layout checking	<input type="checkbox"/>	<input type="checkbox"/>
PCB bareboard fabrication	<input type="checkbox"/>	<input type="checkbox"/>
PCB assembly	<input type="checkbox"/>	<input type="checkbox"/>

35. Please check which of the following hardware description languages (HDLs) you use or plan to use (check all that apply):

	<u>Current Design</u>	<u>Next Generation Design</u>
VHDL	<input type="checkbox"/>	<input type="checkbox"/>
Verilog HDL	<input type="checkbox"/>	<input type="checkbox"/>
UDL/I	<input type="checkbox"/>	<input type="checkbox"/>
Proprietary	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>
No use of HDL	<input type="checkbox"/>	<input type="checkbox"/>

36. What is the total employee count of your company? _____

37. What is your title? _____

38. Which one of the following best describes your primary line of business in each category?

<u>Company</u> <u>(Check only one)</u>	<u>Project Team</u> <u>(Check all that apply)</u>
<input type="checkbox"/>	<input type="checkbox"/> Aerospace/military electronics
<input type="checkbox"/>	<input type="checkbox"/> Automotive
	Communications equipment
<input type="checkbox"/>	<input type="checkbox"/> Telecommunications
<input type="checkbox"/>	<input type="checkbox"/> Data Communications
	Computer Systems (Desktop computers & servers):
<input type="checkbox"/>	<input type="checkbox"/> RISC
<input type="checkbox"/>	<input type="checkbox"/> CISC
	Host-based systems
<input type="checkbox"/>	<input type="checkbox"/> Midrange computers
<input type="checkbox"/>	<input type="checkbox"/> Supercomputers
<input type="checkbox"/>	<input type="checkbox"/> Mainframes
<input type="checkbox"/>	<input type="checkbox"/> Consumer electronics
<input type="checkbox"/>	<input type="checkbox"/> Government
<input type="checkbox"/>	<input type="checkbox"/> Industrial control
<input type="checkbox"/>	<input type="checkbox"/> Medical equipment
<input type="checkbox"/>	<input type="checkbox"/> Semiconductors
	Peripherals:
<input type="checkbox"/>	<input type="checkbox"/> Printers/plotters
<input type="checkbox"/>	<input type="checkbox"/> Mass storage
<input type="checkbox"/>	<input type="checkbox"/> Test/instrumentation equipment
<input type="checkbox"/>	<input type="checkbox"/> Other (please specify)

Name/Title: _____

Telephone: _____

Company: _____

Address: _____

Dataquest®

DB a company of
The Dun & Bradstreet Corporation

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
United States
Phone: 01-408-437-8000
Facsimile: 01-408-437-0292

Dataquest Incorporated
Dataquest/Ledgeway
The Corporate Center
550 Cochituate Road
Framingham, Massachusetts 01701-9324
United States
Phone: 01-508-370-5555
Facsimile: 01-508-370-6262

Dataquest Europe Limited
Roussel House Broadwater Park
Denham, Near Uxbridge
Middlesex UB9 5HP
England
Phone: 44-895-835050
Facsimile: 44-895-835260/1

Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa Chuo-ku
Tokyo 104
Japan
Phone: 81-3-5566-0411
Facsimile: 81-3-5566-0425

Offices in
Costa Mesa, Munich,
Paris, and Seoul

Representative Agencies in
Bangkok, Hong Kong,
Kronberg, North Sydney,
Singapore, and Taipei

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Dataquest Perspective

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Electronic Design Automation Applications

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In This Issue...

Market Analysis

An Update from the HDL Front

The momentum behind VHDL is picking up, while Verilog HDL's momentum is decelerating—but not enough to negate its effect as a viable market force among its established users over the next few years. This Dataquest research reinforces our previous projection of a dramatic surge in VHDL market share through 1995, partially because Japan-based electronics suppliers are beginning to join their North American counterparts in support of this IEEE standard.

By Ron Collett

Page 1

Market Analysis

An Update from the HDL Front

Dataquest's research of the electronic design market indicates that the momentum behind the VHSIC Hardware Description Language (VHDL) is accelerating. Not only is this the case in North America, but Japan-based electronics suppliers have also begun throwing greater support behind the IEEE standard. As a result, we continue to stand by our projection that VHDL's market share will increase dramatically during the next three years.

While VHDL is gaining strength, the Verilog hardware description language (HDL), which is the primary alternative to VHDL, is showing signs of weakness. Despite the efforts of both Cadence and the Open Verilog International (OVI) consortium to strengthen the language's market position, it is clear that Verilog HDL has been able to expand its market perception (as a long-term standard) only marginally over the past six to nine months. This conclusion is based on Dataquest research showing that although Verilog will retain a significant portion of its current user base over the next few years, VHDL will capture most new users adopting the top-down design methodology, *provided that the VHDL-based products meet the market's performance expectations*. Nonetheless, in our view, Verilog HDL will remain a force in the marketplace for at least the next two to three years, especially in light of Cadence's recent acquisition of the Valid Logic installed base.

Whether OVI and other Verilog HDL champions are able to arrest, or at least slow, the VHDL tide remains to be seen. This research examines the current and projected market dynamics impacting the various HDLs.

HDL Market Dynamics

With HDL-based top-down design moving steadily into the mainstream electronic design

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arena, electronics manufacturers are increasingly selecting VHDL as the language of choice. Selection of VHDL over Verilog HDL stems not from any particularly superior capabilities of the language—in fact it is somewhat inferior in many ways—but rather because VHDL is perceived by the market to be fully endorsed and heavily supported by most electronic design automation (EDA) and ASIC suppliers. The upshot is that the collective market power of the EDA and ASIC suppliers promoting VHDL has overshadowed the attempts initiated by Verilog HDL proponents to sustain its momentum. Furthermore, we believe that Cadence failed to seize upon a window of opportunity in 1991 to significantly bolster Verilog HDL's market position. The company's seemingly *laissez-faire* attitude toward Verilog HDL standardization during that time has been a boon to most opponents of Verilog HDL. In our view, this is somewhat unfortunate, given Verilog HDL's ease of use, production-proven status, growing third-party support, ASIC library support, and general popularity among users.

Despite the trend toward VHDL, many electronics manufacturers continue adopting Verilog HDL. We estimate that Cadence sold an additional 1,500 to 1,800 Verilog-XL simulator licenses in 1991. This brings the installed base to approximately 5,500 single- and multiple-user licenses, which translates to 10,000 to 15,000 users of the Verilog-XL simulator. It is important to note, however, that only a portion of the Verilog-XL user base can be viewed as "sophisticated" users of the Verilog HDL. In this context, we estimate that only 30 percent to 35 percent of the 10,000 to 15,000 Verilog-XL users can be considered familiar enough with the language to use it as a design entry vehicle for a top-down design.

Furthering the Verilog HDL cause, several small EDA vendors, including both established companies and start-up ventures, are developing EDA products based on Verilog HDL. Yet to date, none of the larger EDA vendors has announced support for Verilog HDL. Lack of endorsement by the bigger players remains a significant impediment to Verilog HDL standardization, although less so than it did six months ago. Since then Cadence acquired Valid Logic, which significantly boosted the company's market power in the HDL arena. Many users of the

Valid Logic CAE system that at one time would have migrated directly to VHDL are now likely to evaluate and perhaps adopt Verilog HDL.

Still, companies such as Dazix, Mentor Graphics, Racal-Redac, and Viewlogic have not endorsed Verilog HDL. To do so would bolster Verilog HDL's market position, which ostensibly would also strengthen Cadence. Thus, most of Cadence's competitors are loath to support Verilog HDL. In addition, Synopsys, an early and strong advocate of Verilog HDL, has been vigorously promoting VHDL since its acquisition of the Zycad VHDL-based simulation product line in October 1990. Not surprisingly, the company has been gradually distancing itself from the Verilog HDL. Although Synopsys is dwarfed by Cadence and Mentor Graphics, the company has played a central role on the HDL battlefield. Indeed, Synopsys can be credited with helping to establish Verilog HDL as a *de facto* standard in the marketplace. In our view, Synopsys' market power and its ability to influence the direction of the HDL trends will continue to expand as a result of its nearly unfettered penetration of the logic synthesis market.

HDL Market Share in North America and Japan

Dataquest's most recent research in North America and Japan (conducted in the second half of 1991) shows the market share of the various HDLs currently in use. The research was conducted by surveying managers and engineers at several hundred electronic design sites, most of which have 500 employees or more. The survey sample consisted of current users of EDA tools that run on both technical workstations and personal computers. The pie chart in Figure 1 indicates that the percentages of Verilog HDL users and VHDL users in North America are approximately equal. Figure 2 illustrates the current HDL market share in Japan and shows that Verilog HDL currently holds the leadership position in the Japanese market.

It is important to note that the data in Figures 1 and 2 were not captured using a bottom-up approach and, thus, may be somewhat less accurate than a survey of VHDL product suppliers. However, the data correlate well with our bottom-up market share analysis conducted in early 1991 (see the CAD/CAM newsletter entitled "The HDL Showdown: VHDL versus Verilog HDL," April 1991), which shows approximate parity between VHDL and Verilog HDL.

Figure 1
1991 North American HDL Market Segmentation

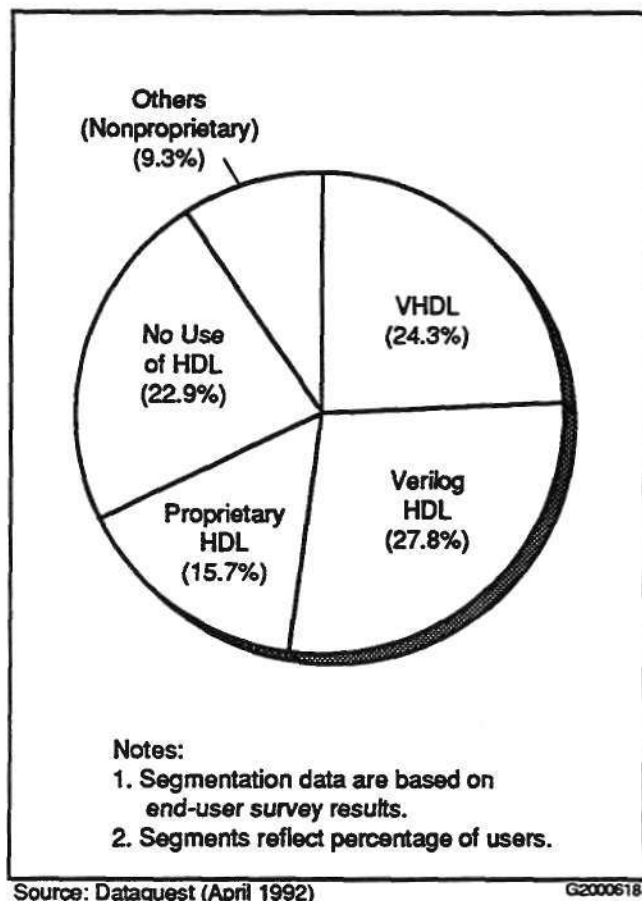
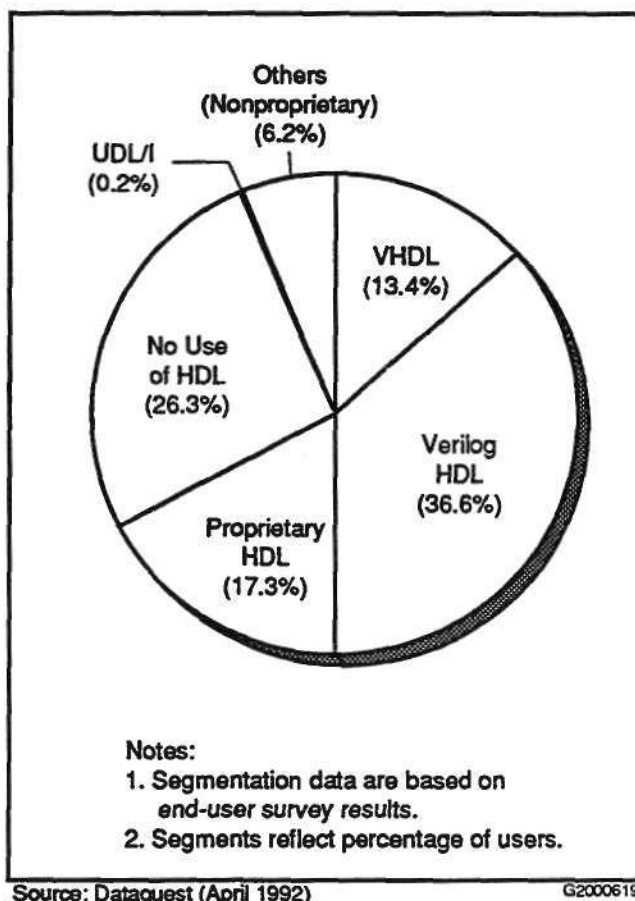


Figure 2
1991 Japanese HDL Market Segmentation



Historical and projected market share figures published in April 1991 show worldwide figures, as opposed to a regional segmentation. At the worldwide level, our figures show that the market shares of Verilog HDL and VHDL were nearly equivalent. This is based on our estimate that Verilog HDL and VHDL's North American market shares were approximately equal, whereas in Japan, Verilog HDL held a significant edge; in Europe, a less exhaustive study indicated that VHDL held a significant advantage over Verilog HDL.

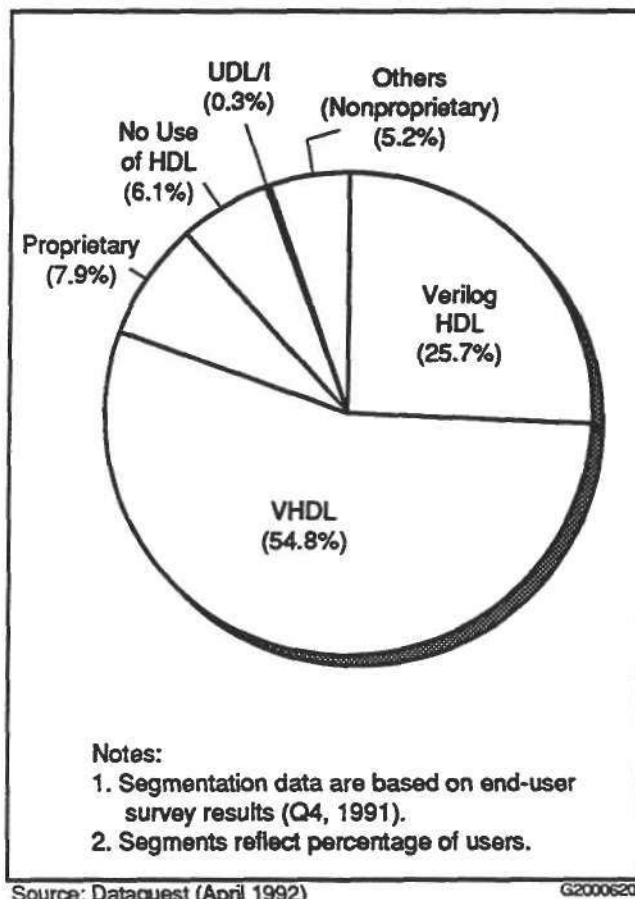
North American Outlook

Among the most significant issues facing EDA software vendors and ASIC suppliers is determining how the HDL landscape will shift over the next three years. Dataquest's most recent studies shed light on the subject. Figure 3 shows the projected market share of the various HDLs in North America. The chart was generated by

surveying electronic design groups at over 250 different sites throughout North America. Engineers and managers were asked which HDL they planned to use for their next-generation design. The results show that an overwhelming percentage plan to adopt VHDL.

Despite the strong response favoring VHDL, it is important to recognize that VHDL-based tools will realize their market share potential only if they fulfill the market's performance requirements. The data in Figure 3 is simply a reflection of the market's current thinking. Our assumption underlying the data is that VHDL's performance problems will be resolved and that the ASIC libraries will be available for VHDL tools. Most EDA vendors maintain that VHDL-based tools will deliver the necessary performance requirements, but users still complain about VHDL's slow simulation speed and excessive memory requirements. We believe that these performance issues will be resolved, given the

Figure 3
Projected 1995 North American HDL Market Segmentation



enormous research and development efforts being put forth by VHDL advocates. Moreover, even if these efforts produce less-than-satisfactory results, skyrocketing compute performance and dramatic improvements in price/performance of compute platforms will substantially mitigate the problems.

As an indication of the market's desire to hedge its bet on VHDL, our research confirms that much of the Verilog HDL installed base plans to adopt VHDL without disposing of Verilog HDL. Indeed, approximately 82 percent of the Verilog HDL-only installed base in North America (those that are using Verilog HDL and have not adopted VHDL) will continue using Verilog HDL over the next two to three years, if not longer. Only 18 percent plan to replace it with VHDL. Indicative of an emerging trend toward coexistence between Verilog HDL and VHDL, 27 percent of the Verilog HDL-only installed

base plans to adopt VHDL and use both Verilog HDL and VHDL for at least the next two years. However, 55 percent of the Verilog-only users will continue using the language in the absence of VHDL. In sum, about half of the the Verilog HDL-only installed base will continue to cast its loyalty exclusively toward Verilog HDL. The other half will either forsake Verilog HDL for VHDL or adopt both languages.

Among the current base of VHDL-only users in North America (those that are using VHDL and have not adopted Verilog HDL), less than 2 percent plan to replace VHDL with Verilog HDL. However, approximately 6 percent of the VHDL-only user base will also adopt Verilog HDL and use both languages.

In the North American electronic design market, adoption rates of VHDL will be fastest in the military and aerospace industries, which is not surprising given that VHDL development was funded and later mandated by the U.S. Department of Defense. What is perhaps surprising, however, is that the computer industry, which is a Verilog HDL stronghold, will also begin to aggressively adopt VHDL. Today, only 10 percent of the computer industry is using VHDL. We expect this figure to reach at least 40 percent during the next 18 to 24 months.

Widespread adoption of VHDL is also expected among North American semiconductor manufacturers. Approximately one-third of the industry has already begun using VHDL. Our research indicates that at least 50 percent to 60 percent of the semiconductor sector will be using it by the end of 1994.

VHDL will also make significant inroads into the communications equipment design arena. Approximately 25 percent of the communications industry has adopted VHDL, but this figure will more than double over the next two years.

Japanese Outlook

From 1989 through 1991, the Japanese market wavered in its support of any particular HDL, although the tendency was moving toward Verilog HDL during that period. We believe that the bias favoring Verilog HDL was (and is) a by-product of the ubiquitous presence of the Verilog

HDL-based simulator, Verilog-XL, which expanded significantly once Cadence put its distribution muscle behind it (after acquiring the technology from Gateway Design Automation). It was natural for users of the Verilog-XL simulator to favor adoption of the complementary Verilog HDL. Current HDL market share reflects Cadence's overall strength in the Japanese market—strength that is rooted in Cadence's stronghold on the IC design market.

Our studies conclude that approximately 34 percent of the Verilog HDL-only installed base will replace the language with VHDL. Thus, coexistence between VHDL and Verilog HDL is projected to be widespread in Japan, with 53 percent of the Verilog HDL-only user base planning to use both Verilog HDL and VHDL. Only 13 percent will continue to use Verilog HDL exclusively—that is, without adopting VHDL.

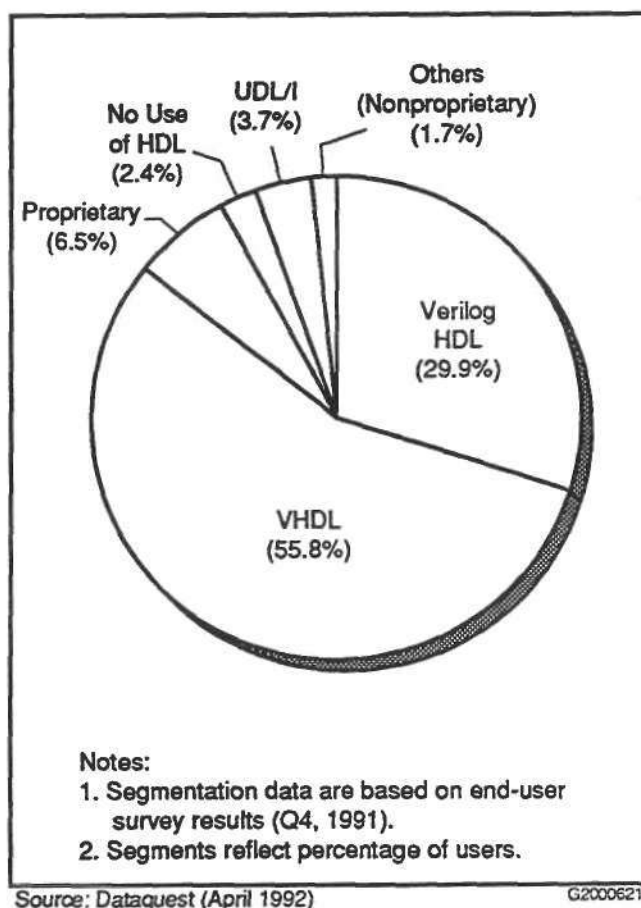
The number of VHDL-only users in Japan is currently too small to draw any solid conclusions, but early indications suggest that 10 percent to 20 percent may displace it with Verilog HDL, and another 15 percent to 25 percent will end up using both Verilog HDL and VHDL. The upshot is that we expect approximately 60 percent of the VHDL-only base to use VHDL exclusive of Verilog HDL.

Reaction to VHDL among most Japanese manufacturers over the past few years has been less than positive. Negative perceptions about the language among Japanese manufacturers have been shaped by a number of factors. For instance, VHDL's DoD roots were viewed somewhat negatively. Electronics manufacturers believed that the language did not meet the needs of the commercial sector. Indeed, because VHDL was initially developed as a documentation language, many of its constructs did not lend themselves to either simulation or logic synthesis. Furthermore, VHDL was more difficult to use than other languages: Its gate-level simulation speed was slow; the standard itself was open to interpretation; and applications were being developed for unique subsets of the language, which potentially precluded the mixing and matching of VHDL-based tools from different vendors. Moreover, early widespread endorsement of VHDL among EDA vendors was viewed by Japan-based electronics manufacturers

as a preemptive response aimed at curbing the expanding presence of Cadence's Verilog HDL. In sum, VHDL was perceived as language unable to meet the needs of the customer, but nonetheless was being forced upon the market by the U.S. government and an array of EDA suppliers determined to weaken Verilog HDL's market position.

Many of the problems and stumbling blocks surrounding VHDL persist today. Yet, the collective market power of the VHDL camp, which consists not only of EDA vendors but also of ASIC suppliers, has eclipsed much of the momentum previously garnered by the Verilog HDL. Figure 4, which shows the projected market share of the various HDLs in Japan, serves as a clear indicator of the collective mind-set of the Japanese electronics industry. This figure reflects the survey responses from electronic design groups at over 100 different sites throughout Japan. Engineers and managers

Figure 4
Projected 1995 Japanese HDL Market Segmentation



were asked which HDL they planned to use for their next-generation design. The results show that an overwhelming percentage plan to adopt VHDL. Conversely, although the Verilog HDL base will grow by 15 percent to 20 percent, its market share vis-a-vis VHDL in Japan will decline significantly.

Recent shifts toward VHDL within the Japanese market stem from widespread EDA industry support of the language, as well as a large number of VHDL products being introduced into the market. Acquiescence toward VHDL and its projected coexistence with Verilog HDL is also a reflection of the fact that Japanese manufacturers are willing to accept VHDL on a trial basis but are unwilling to replace Verilog HDL with VHDL at this point. Our research shows that adoption of VHDL will be strongest in the automotive, computer, and semiconductor industries. Coexistence between Verilog HDL and VHDL will be widespread in the semiconductor industry, a current stronghold of Verilog HDL.

UDL/I HDL, which was injected into the public domain but was originally developed as a proprietary language primarily by NTT Laboratories in Japan, has yet to capture the market's attention. We stand by our projection that the earliest possible opening of a significant market window for UDL/I will be in 1995 or 1996.

Dataquest Perspective

Although Verilog HDL's market position has been bolstered by both its injection into the public domain and the creation of the OVI consortium, Dataquest believes that Cadence has not applied the necessary marketing, promotion, or support over the past nine months to emerge from the shadow cast by VHDL. Were it not for the fact that Cadence acquired Valid Logic, we would be inclined to believe that Verilog HDL's market position would erode even faster as a result of Cadence's limited efforts. However, the acquisition has the potential to significantly expand both the life span and market size of Verilog HDL. Even before the acquisition, usage of Verilog HDL within the Valid Logic installed base was widespread. With direct access to non-Verilog HDL customers in the Valid Logic base, Cadence is in a better position to persuade a significant percentage to adopt Verilog HDL. Of course, it should be pointed out that Cadence

offers both Verilog HDL and VHDL-based products.

OVI has also been stepping up its efforts to strengthen Verilog HDL's position, as follows:

- OVI has become a distributor of a restricted version (protected against reverse engineering) of the Verilog simulator that can be used to validate third-party Verilog HDL-based tools.
- Several Verilog HDL manuals have also been created, including a language reference manual and a programming language interface manual.
- A recently held user group meeting attracted several hundred attendees and approximately 20 vendors on the exhibition floor.
- OVI's membership has burgeoned to nearly 50 members.
- A test technical subcommittee has been established to identify and address test requirements as they pertain to Verilog HDL.
- Several discussions are under way within the various technical subcommittees to determine what, if any, extensions should be incorporated into the language.

Even more significant is OVI's recent decision to begin pressing the IEEE to accept the Verilog HDL as a standard hardware description language.

Finally, an increasing number of start-up ventures have begun investigating and/or developing EDA products based on the Verilog HDL. Fledgling companies in this camp are motivated by the prospect of penetrating the large Verilog-XL simulation installed base. With all of the activity surrounding both Verilog HDL and VHDL, Dataquest believes that the two languages will coexist over the next several years, if not longer. We estimate that by 1996 there will be over 30,000 users of Verilog HDL and VHDL (see Figures 5 and 6).

The opportunity for EDA vendors is to offer the market tools and environments that support this paradigm. Indeed, the market opportunity for language-independent tools portends to be rich.

By Ron Collett

This article also appears in the *ASICs Worldwide Dataquest Perspective*.

Figure 5
Projected Installed Base of VHDL Users*

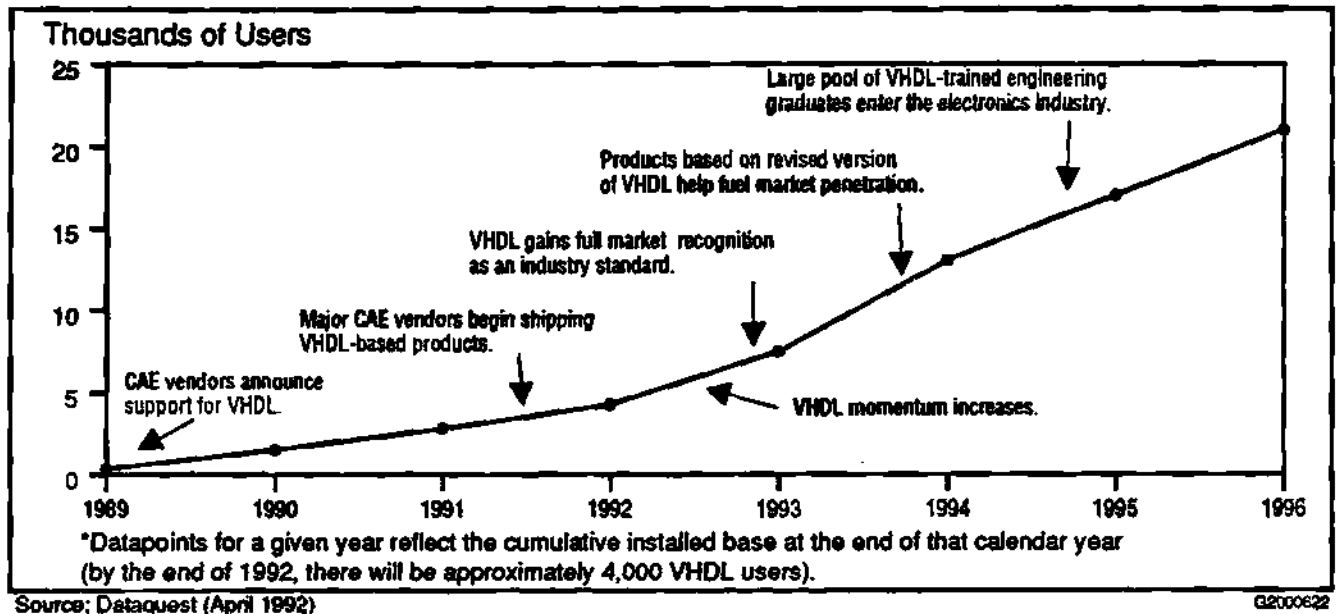
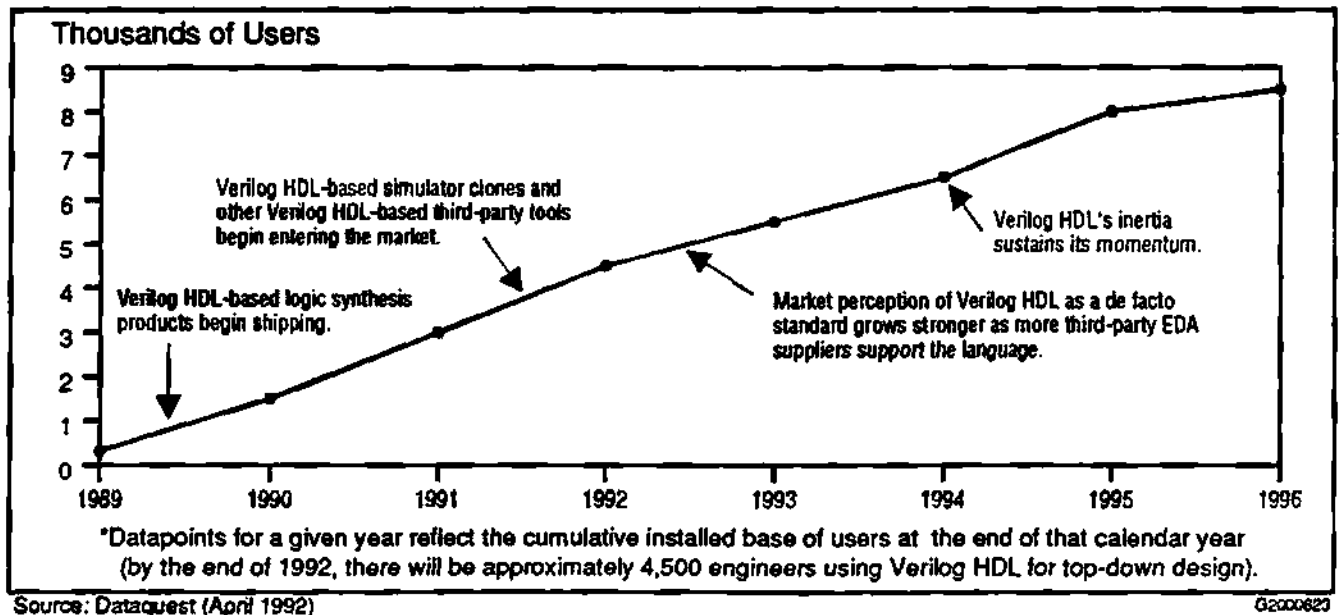


Figure 6
Projected Installed Base of Verilog HDL Users*



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Electronic Design Automation Applications

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In This Issue...

Market Analysis

Top-Down Design Jettisons into the Mainstream

There will be several fundamental shifts as top-down design methodology increasingly penetrates the design market: increasing use of mixed-level HDL-based simulators, greater reuse of previous-generation designs, and expansion of the logic synthesis market. Dataquest believes that there is still room in a crowded field for EDA vendors who can search out the emerging areas yet to be addressed in the top-down design market.

By Ron Collett

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Market Analysis

Top-Down Design Jettisons into the Mainstream

Top-down design and the electronic design automation (EDA) tools supporting this methodology are rapidly moving into the mainstream design market. This, of course, should not be surprising given the substantial productivity improvement inherent in the use of hardware description languages (HDLs), logic synthesis tools, mixed-level logic simulators, and test automation packages that support test insertion and automatic test vector generation. This article profiles the expanding top-down design market.

Increased Productivity Fuels Top-Down Design Market Growth

Greater productivity is the primary force driving the increased use of the top-down design methodology and the supporting EDA tools. It has been well-documented by Dataquest and others that designers using an HDL-based design environment, which includes logic synthesis, can expect productivity gains of two to five times greater than with conventional gate-level design methods. (The metric we use is gates/month/engineer). Our analyses show that with a gate-level approach (using schematic entry) a designer can expect to design approximately 1,000 gates per month. In contrast, using a hardware description language together with logic synthesis, engineers can expect to design 2,000 to 5,000 gates per month.

Moreover, these figures do not take into account the additional productivity boost realized when large functional blocks of HDL are reused. Reuse of HDL is a significant and emerging trend. The net impact of reusing HDL megacells yields significantly higher productivity in terms of gates/month/engineer.

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Other advantages of top-down design tools include an enhanced ability to perform trade-offs in the areas of architectural design, chip size, and circuit speed. In the absence of HDL-based logic synthesis and supporting technologies, engineers face the prospect of performing a significantly greater number of design iterations to hone in on an optimal solution.

Migration from one chip technology to another, commonly referred to as design remapping, is yet another benefit of the technology. Examples of remapping include the migration from one process technology to another, such as remapping a 1.2 micron CMOS design to 0.8 micron CMOS implementation, and architectural migration, such as remapping a field-programmable gate array (FPGA) design to a mask-programmable gate array or cell-based IC.

Reusability: Exploiting the Power of Top-Down Design

Dataquest's research shows that electronics manufacturers in both the United States and Japan are aiming to reduce product design cycles by 20 to 30 percent between the current generation and the next generation of electronic designs. Reducing cycle time by this amount would not be so daunting if the demands being placed on design teams were not expanding so rapidly. For instance, when asked to rank the three most important factors influencing a product's ability to achieve market success, manufacturers cite reducing time-to-market first, followed by increasing functionality, and reducing costs. Reconciling these three competing objectives falls directly upon the shoulders of the design teams.

Given that the goal is reducing design time and costs while significantly increasing functionality, it is unrealistic to believe that simply improving engineering talent and automation will be enough to reduce product design time by 20 to 30 percent. Dataquest believes that manufacturers must also create a technology infrastructure that supports large-scale reuse of existing designs. Providing such technology is a clear opportunity for EDA vendors. Today, 34 percent of the electronics from an average electronic product (built by North American electronics manufacturers) is circuitry that has been reused from an existing product. In Japan, the figure is slightly higher, 37 percent. In our view, this level

of reuse will not be enough to remain competitive. Dataquest believes that simultaneously increasing product functionality, reducing cost, and reducing design time (by 20 to 30 percent) will require electronics manufacturers to design products comprising 45 to 55 percent of reused circuitry (see Figure 1).

Integral to the reuse design methodology will be the creation of logic functions described in an HDL. These functions can be archived and resynthesized in subsequent designs using the various commercially available logic synthesis packages.

We believe that the backbone of tomorrow's technology advantage will depend heavily on an electronics manufacturer's portfolio of intellectual property or designs. Reuse of these designs will become critical as manufacturers strive to fill the widening gap between design productivity levels and the relentless advancement of semiconductor fabrication capabilities. Establishing a library (or "war chest") of designs that can be readily reused (and perhaps enhanced) will enable manufacturers to both reduce design time and improve product quality. Quality will improve because the reused portion of the system will have already undergone verification during the previous product design cycle. Of course, these designs will require reverification when integrated into the new product design.

Hidden within the reuse methodology is the learning curve associated with archiving designs and integrating the circuitry into the next-generation product. Dataquest's research indicates that the methodology requires a 12- to 18-month learning curve.

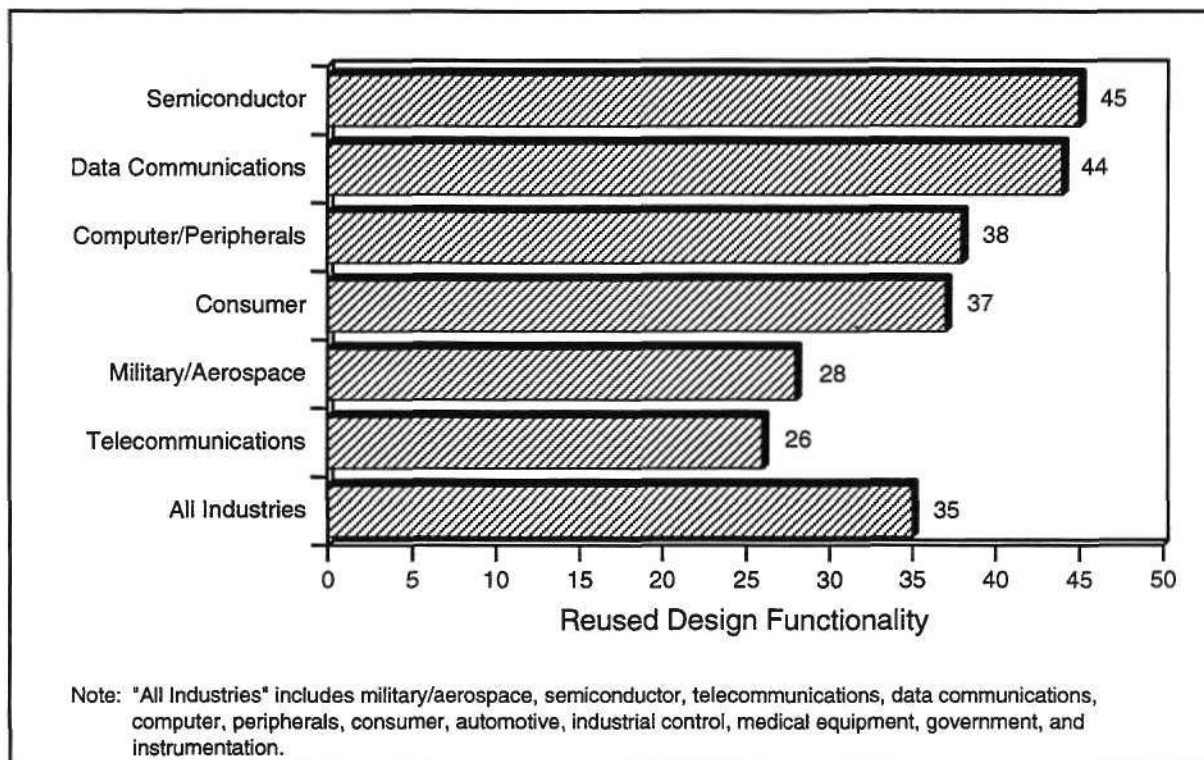
Akin to remapping, which was discussed earlier, foundry independence is another key advantage inherent to reusable HDL models. Because the circuitry is described in a high-level generic language, the models can be retargeted to almost any foundry's fabrication process.

Dissecting the Top-Down Design Market

Logic Synthesis

The logic synthesis market continues to experience robust expansion, despite relatively few vendors. Over the past three years, the leading players in the EDA industry have been unable to mount a serious threat to Synopsys' market position. Synopsys has been

Figure 1
Percentage of Circuitry Reused, Segmented by Industry



Source: Dataquest (July 1992)

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the source of most of the growth experienced in the logic synthesis arena during the past three years. For example, in 1989 the company captured 33 percent market share of a \$13.7 million software market (ASIC-based logic synthesis only). In 1990, the company recorded logic synthesis sales of \$16 million (software only), yielding the company 52 percent market share. Dataquest's preliminary analyses indicate that Synopsys' market position gained even greater strength in 1991.

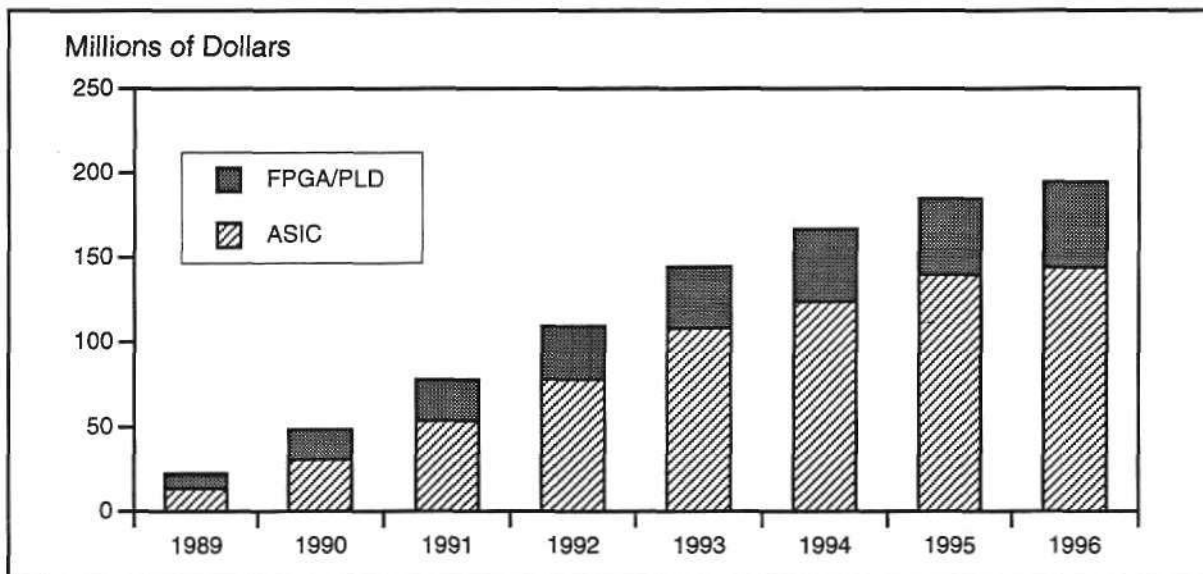
Synopsys' position in the synthesis market is likely to remain healthy for at least the next six to twelve months. It will take that amount of time for competitors to mount any kind of reasonable challenge to the company. In our view, logic synthesis technology is the cornerstone of the top-down design EDA environment, which is why Synopsys is so successful.

We expect the logic synthesis market to continue experiencing strong revenue growth over the next two to three years. However, by early 1994 we anticipate that the industry will be filled with an abundance of suppliers, which

in turn will cause substantial price erosion of synthesis products. Already, Synopsys has been joined by an array of companies hoping to gain a share of the market, including Mentor Graphics, Cadence, Dazix, Racal-Redac, Viewlogic, Exemplar Logic, and Compass Design Automation. A number of start-up companies are also developing products aimed at the logic synthesis market. Supply-side fragmentation of this magnitude will undoubtedly diminish both revenue and profit opportunities (see Figure 2).

Despite the increased productivity that logic synthesis tools yield, users consistently complain about the long run times and excessive disk space required to compile designs. Advances in computing performance should mitigate the problem somewhat; but as compute power rises, so too does design complexity. Thus, the problem is analogous to running on a treadmill: the greater the compute power, the more complex the design tasks will become. Indeed, the industry is routinely witnessing design starts that boast 50,000 to 75,000 gates.

Figure 2
Historical and Projected Growth of Worldwide Logic Synthesis Market



Source: Dataquest (July 1992)

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HDL and Next Generation Design Entry Opportunities

Dataquest's research shows that the traditional gate-level schematic entry market has reached maturity and is moving into a period of decline. The technology has become a commodity and the market is virtually saturated, although the replacement and low-end markets remain strong. The gate-level schematic entry market grew a negligible amount between 1989 and 1990. Preliminary estimates for 1991 suggest figures similar to that of 1990. This should come as no surprise to companies supplying products to this sector. Gate-level schematic entry is "last generation" technology that is used primarily for less complex designs. Nearly all of the schematic entry systems currently on the market have been geared toward bottom-up design, as opposed to top-down design. We believe that the gate-level schematic capture market, which has remained flat over the past few years, will begin to shrink in size (see Figure 3).

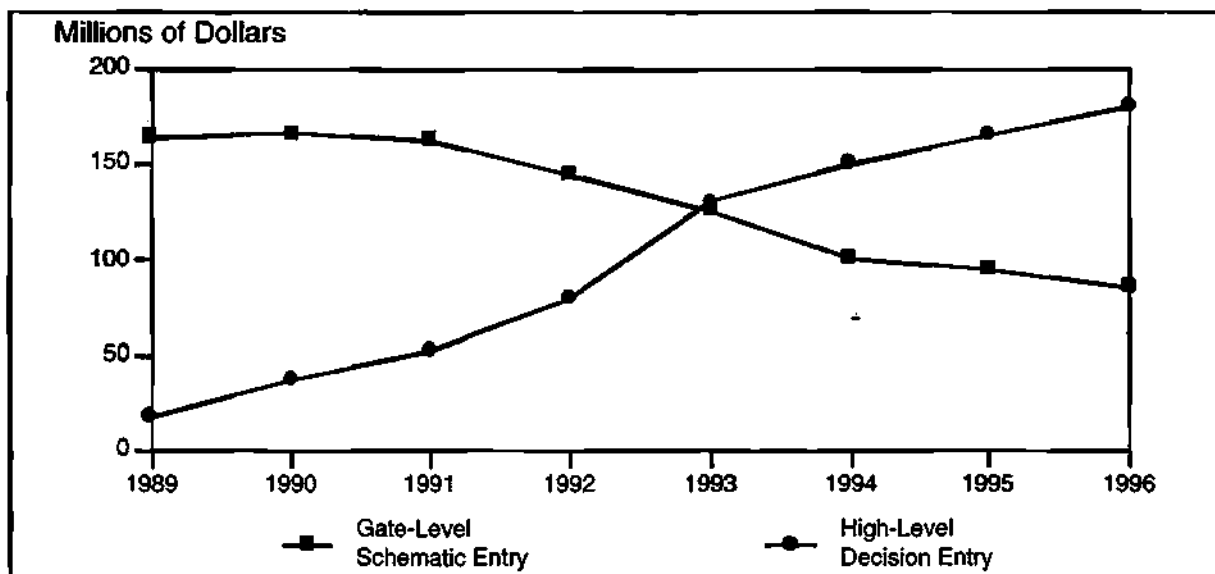
Fast on the heels of the schematic entry market has been the HDL entry opportunity, which includes the text editors, debuggers, and user interface software needed for designing with languages such as VHDL and Verilog HDL. Segmenting the design entry market reveals that the HDL entry market is indeed

experiencing rapid expansion and, in our view, will continue to exhibit strength over the next two to three years. In fact, some designers and electronics manufacturers have completely discarded schematic entry and have begun relying exclusively on HDL for design entry. Despite the trend, we believe that this is somewhat of an aberration. Dataquest projects that most designers will use a combination of HDL and graphical entry in the future.

In our view, designers will gravitate toward next-generation design entry environments that combine high-level graphical capture, HDL-based entry, gate-level schematic entry and even traditional entry technologies for programmable logic devices (PLDs) and FPGAs such as Boolean equations, truth tables, and state machine bubble diagrams. In other words, we believe that the mainstream design market will want a heterogeneous design environment. Some recently introduced first-generation systems address pieces of the heterogeneous requirement.

The marketplace clearly prefers graphical entry, as demonstrated by how HDL entry is ranked in comparison to graphical entry. On a scale of one to five, with five being "most important" and one being "least important," a statistically valid sample of users assign a value of 4.1 (mean score) to graphical

Figure 3
Historical and Projected Growth of Worldwide Design Entry Software Market



Source: Dataquest (July 1992)

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(schematic) entry and a value of 3.7 (mean score) to HDL entry.

Nevertheless, many designers will deviate from the projected trend, preferring instead to use HDL as their exclusive input vehicle. As a result, next-generation heterogeneous environments must accommodate the full spectrum of design entry preferences.

The graphical capabilities of next-generation entry products will be integral to improving design productivity. This next generation of graphical design entry technology will enable designers to use a building block approach whereby the individual blocks are a combination of very large scale integration (VLSI) functions described in HDL, compilers, and hardwired core functions.

With HDL blocks, designers will reuse and modify existing blocks for subsequent designs, as well as create new blocks to meet the demands of the project at hand. The HDL functions will also be represented as graphical blocks, but the designer will be given the freedom to quickly access and modify the blocks' internal HDL. The HDL source code comprising the various blocks within a system will be linkable and synthesizable, and thus capable of generating a gate-level implementation of the ASIC design.

This technology will set the stage for the design entry and verification opportunity that will emerge in the second half of the decade. At that time, we expect market demand to shift toward products that combine high-level graphical capture with HDL-based, architectural-level top-down design environments. These environments will offer the ability to perform "correct by specification" design. To reach this level, existing hardware description languages and logic synthesis tools will have to be extended to support system-level top-down design. It is reasonable to believe that there may be an opportunity to provide new HDL technology that dovetails with the existing HDL-based systems based on Verilog HDL and VHDL. We envision that these systems should allow engineers to work in an environment that automates and tightly integrates the full spectrum of design entry and verification—from design specification stage through gate-level implementation—with rapid feedback from the physical design domain. In addition, these environments must enable engineers to perform hardware/software codesign and analysis.

Figure 3 illustrates the historical and projected size of the high-level design entry market. The figure shows that the market expanded from \$15.8 million in 1989 to \$34.9 million in 1990. Initial estimates indicate that the market grew

by at least another 50 percent in 1991. We expect the market to reach 80 million this year. By 1996, the market should peak at approximately 180 million.

Design Verification in the Top-Down Design Era

According to our most recent research, the market cites simulation as the most important weapon in its computer-aided engineering (CAE) arsenal. On a scale of one to five, with five being "most important" and one being "least important," the market assigns an average rating of 4.6 to simulation. In fact, the results of our research show that 69 percent of the market assigns it a 5. This bodes well for the future opportunities in the simulation arena, although rigorous price competition among the myriad of suppliers will undoubtedly limit revenue growth.

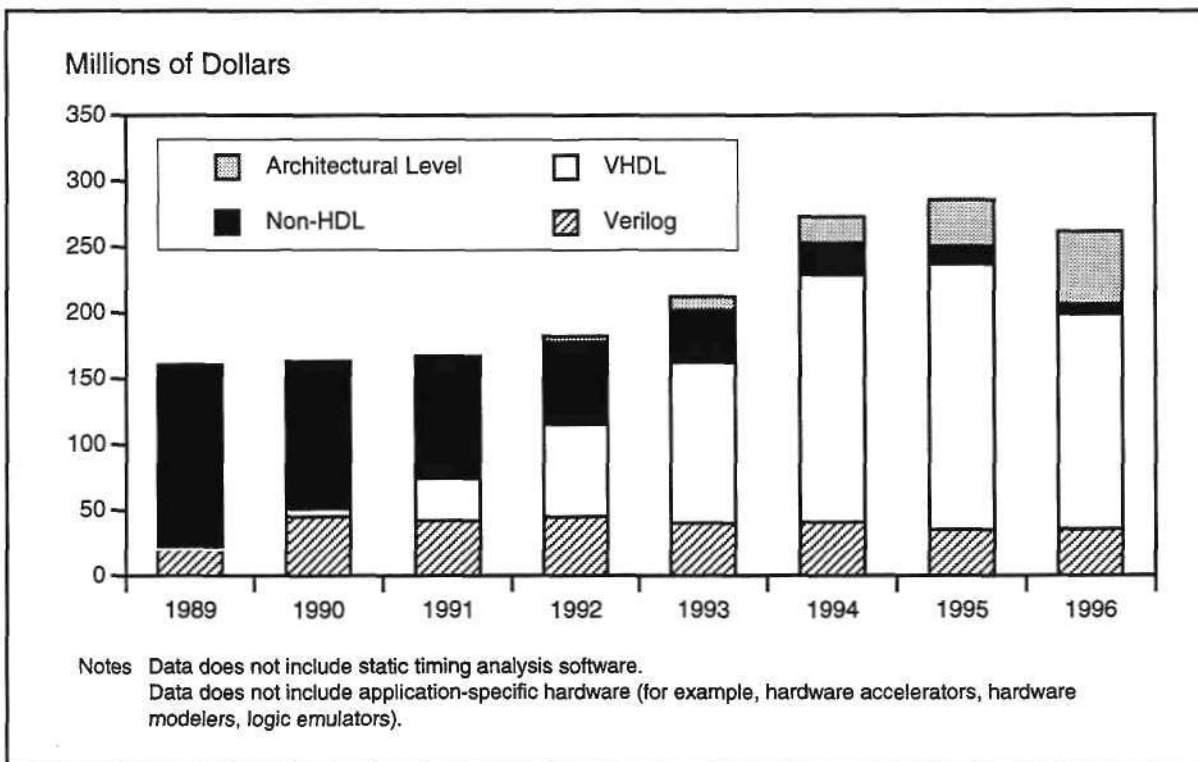
Despite the market's desire for simulation, the simulation market has remained relatively flat over the past few years. The market grew a negligible amount from 1989 to 1990 (see Figure 4). Preliminary estimates for 1991

indicate that again the market experienced little—if any—growth in 1991. Why?

We have uncovered several factors contributing to the market's sluggish performance. First, in recent years, only Cadence's Verilog XL simulator received strong market pull. Initially, the product's appeal was driven by its exceptional gate-level performance. Market pull increased as leading edge designers began using the Verilog HDL for top-down design. Competitors in the simulation market have been unable to match Verilog XL's success primarily because the products lacked any or all of the following:

- Fast gate-level execution speed
- Mixed-level simulation capabilities
- Strong modeling/design language
- Standard modeling/design language (such as Verilog HDL or VHDL)
- ASIC library support

Figure 4
Historical and Projected Growth of Worldwide Software Simulation Market



Source: Dataquest (July 1992)

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With many companies in the EDA industry now prepared to ship simulation products that have cleared some or all of the above hurdles, the simulation market is ready to expand. Our research confirms that the need for additional simulation licenses is pervasive throughout the electronic design market. The market is indicating that it needs to increase the number of licenses currently in place by approximately 20 percent. Our preliminary estimates show that the total installed base of merchant simulator licenses is approximately 50,000 licenses (approximately two to three percent are estimated to be multiuser licenses). Thus, over the next 12 to 24 months, the market will expand by approximately 10,000 licenses, equating to a market opportunity of \$175 to \$200 million for additional licenses.

There is also an emerging simulator replacement opportunity. We estimate that approximately 75 percent of the licenses installed in the market are non-HDL-based simulation licenses (approximately 40,000 licenses). The market for non-HDL simulators is declining precipitously in the face of the trend toward top-down design. Electronics manufacturers are looking to replace these licenses with HDL-based mixed-level simulation products. We expect the replacement process to occur over the next three to five years. We believe that the retirement rate of these licenses will range from a low of 4,000 licenses in 1992 to a high of 13,000 in 1994.

Our preliminary estimates indicate that the HDL-based mixed-level simulation market

reached approximately \$70 million in 1991, up from approximately \$50 million in 1990 and \$29 million in 1989. The market should reach \$90 to \$100 million this year. Our forecasts also indicate strong growth in the architectural-level simulation market. Verification tools in this category are those that will enable the user to simulate and verify designs at a higher level than that which has been traditionally available (for example, tools that allow a computer designer to determine the optimal number of processors and cache size for a multiprocessor design, given a fixed bus bandwidth). Other tools in this category would include those supporting formal verification.

Dataquest Perspective

It is clear that as the top-down design methodology makes increasing penetration into the mainstream design market, a number of fundamental shifts will occur in the market. These include increasing use of mixed-level, HDL-based simulators, greater use of logic synthesis, and the adoption of policies regarding the reuse of previous-generation designs. Dataquest believes that there is still an opportunity to capitalize on the growth of the top-down design market, but as more competitors enter the fray, average selling prices will experience a precipitous decline. Thus, the goal for EDA vendors should be to search out those emerging areas that have yet to be addressed by the myriad of players chasing the top-down design market.

By Ron Collett

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Dataquest Perspective

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In This Issue...

CAD/CAM/CAE

Temperatures Rise in the PCB Thermal Analysis Market

The thermal issues surrounding electronic design are gaining increasing importance across all industry sectors. In response, all broad-line EDA vendors now offer a thermal analysis capability. Yet, few thermal licenses have been sold. This research defines the thermal market sectors, analyzes the issues that drive this market, and presents Dataquest's market forecast on this underpenetrated market.

By Jim Tully

Page 1

CAD/CAM/CAE

Temperatures Rise in the PCB Thermal Analysis Market

Thermal problems are a fact of life when designing electronic systems. In some applications, thermal factors outweigh all other design constraints, requiring considerable analysis. In recognition of this apparent need, EDA vendors entered the thermal analysis arena typically three years ago. Yet sales of thermal analysis software have been disappointingly sluggish. Why should this be? And how will this market develop in the future? This research analyzes the thermal analysis market and presents Dataquest's conclusions on this market anomaly.

Product/Market Definition

The electronic thermal analysis market comprises three broad sectors:

IC Thermal

This sector consists of simulation tools for predicting the thermal performance of an individual integrated circuit (IC)—ASIC or full-custom. Typically, the two factors of interest are:

- 1) Thermal dynamics of individual gates or transistors
- 2) Thermal issues surrounding the current-carrying capacity of metalization routing.

The above processes are analyzed in the context of a sealed package with restricted thermal conduction.

PCB Thermal

The PCB thermal category is made up of analysis tools designed to simulate the thermal performance of printed circuit boards or multi-chip modules. These tools usually produce a thermal contour map of the board and may

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CAD/CAM/CAE—Electronic Design Automation Applications

allow the sensing of temperature at specific points, usually accessing average power dissipation parameters from a system library. They are primarily designed to give the layout specialist an approximate indication that the placement of components will not lead to gross thermal problems. Such tools are predominantly concerned with conduction effects, but also consider sufficient convection effects to account for board orientation.

System Thermal

The system thermal sector includes analysis tools designed to simulate the thermal performance of an electronic enclosure or cabinet containing active electronic circuits. They may allow air flow and temperature to be simulated and displayed within a three-dimensional image of the enclosure. They may also allow iterative "what-if" analyses in the location of fans, baffles, card cages, disk drives, and so on. Such tools are based around computational fluid dynamics technology and are predominantly concerned with convection effects.

The analysis presented below considers the second of these categories—the PCB thermal market.

PC Thermal Vendor Companies

Most of the vendors in the overall thermal analysis market operate in the mechanical CAD/CAM field, giving most of their emphasis to thermal deformation, heat transfer, combustion analysis and similar finite element analysis applications. The electronic thermal market is relatively small and concentrated, involving broad-line EDA and specialized thermal companies that focus on the electronics sector. But these EDA companies have sold relatively few

thermal analysis licenses following their significant investment in this field. Why is this so?

The broad-line EDA vendors realized the underlying need for thermal analysis tools, which was reinforced by the performance of small specialist thermal companies that appeared to be doing good business in the field. They sensed a major opportunity that, at that time, was only a narrow niche opportunity mainly involving military and aerospace companies—two sectors then in decline. The EDA vendors gradually developed or acquired thermal analysis technology but were ahead of the widespread need for these tools (see Table 1). Unfortunately, they experienced self-inflicted misfortune for the following reasons:

- They did not adequately verify the size of this market in advance, ultimately discovering that a market need *did not exist* at that time (at least not from accessible EDA users).
- The promotion of thermal analysis capabilities by the EDA vendors caused a situation where large-volume end users began to specify thermal analysis as a product requirement when inviting tenders for large systems. Yet, when orders were subsequently placed, thermal was not included. In effect, it became a feature that could disable an EDA system sale if it was not present, but it could not guarantee the sale if present.

This left EDA vendors in the worst possible situation: being forced to offer the tools when thermal analysis was, at best, an enabling technology helping to generate wider EDA sales. The situation was worsened by the great difficulty of EDA sales and support personnel in communicating with thermal specialists from these companies. This required an extended learning

Table 1
Broad-Line EDA Companies' Approach to Thermal Analysis Tools

Company	Product	Development Approach
Mentor	Integrated with Package Station	Internal Development
Racal-Redac	Visula Thermal/Promethe	Company Acquisition (Thom'6)
Cadence	Thermax	Company Acquisition (Helios)*
Valid	ThermoStats	Technology Acquisition (ADL)*
Dazix	Pacific Numerix	Third-Party Integration

*Note: After the Cadence/Valid merger, Thermax is the surviving product.
Source: Dataquest (August 1992)

curve on behalf of the EDA companies. All of these factors point to one conclusion: thermal analysis was an unprofitable business for EDA companies.

A Changing Market

In the early days of the PCB thermal market, the technology was only available via specialist thermal companies. After a period of time, most of these companies either exited from the business or were acquired by larger companies. Today, most PCB thermal products are shipped by EDA companies. Furthermore, these companies are relatively powerful, effectively cornering the market. Some 70 to 80 percent of the PCB thermal market is controlled by the following companies:

- Mentor Graphics
- Cadence
- Racal-Redac
- Dazix (shipping products from Pacific Numerix)

To date, thermal analysis has been viewed as a back-end layout operation and sales have been closely linked with sales of PCB layout packages. In order for the PCB thermal market to grow, we believe that sales must (and will) become linked more with CAE for the following reasons:

- New CAE design methodologies have the capacity to "pull in" thermal analysis.
- There are far more electronic design engineers than layout specialists.
- The CAE market is substantially bigger than the PCB layout market.
- The CAE market is growing much faster than the PCB layout market.

Dataquest end-user research indicates that in order for engineers to be attracted to thermal analysis tools, vendors must be prepared to enhance their products in the following ways:

- Easy-to-use tools—A greater level of ease of use is required by electronic engineers when compared to layout specialists. Engineers tend to be casual or occasional users of EDA tools. It must be easy and quick to relearn the use of the tools after several months of nonuse.

- Sufficiently accurate tools—The tools must be sufficiently accurate as to allow the engineer to rely on the integrity of the results. A problem with current generation thermal tools is that component power dissipation figures are taken from component libraries. The power dissipation figure used is often the average or maximum *static* power dissipation. A much closer approximation is the operating power dissipation, which can only be obtained from a circuit simulator.
- Tools should assist relatively simple design tasks—The tools should assist relatively simple design tasks such as the design of a heat sink (or assistance in heat-sink selection). Engineers sometimes spend appreciable amounts of time undertaking such calculations using manual design methods. A comment often heard is "what good is a thermal analysis tool if it can't even help me design a heat sink?"

We believe that the abovementioned companies during the next four to five years will incorporate these kinds of product features into their thermal products and successfully target electronic engineers. This will result in reasonably high growth (see the "Market Size and Forecast" section later in this analysis). Furthermore, targeting of electronic design engineers will fundamentally change the overall use pattern of thermal analysis tools during the next five years (see Figure 1).

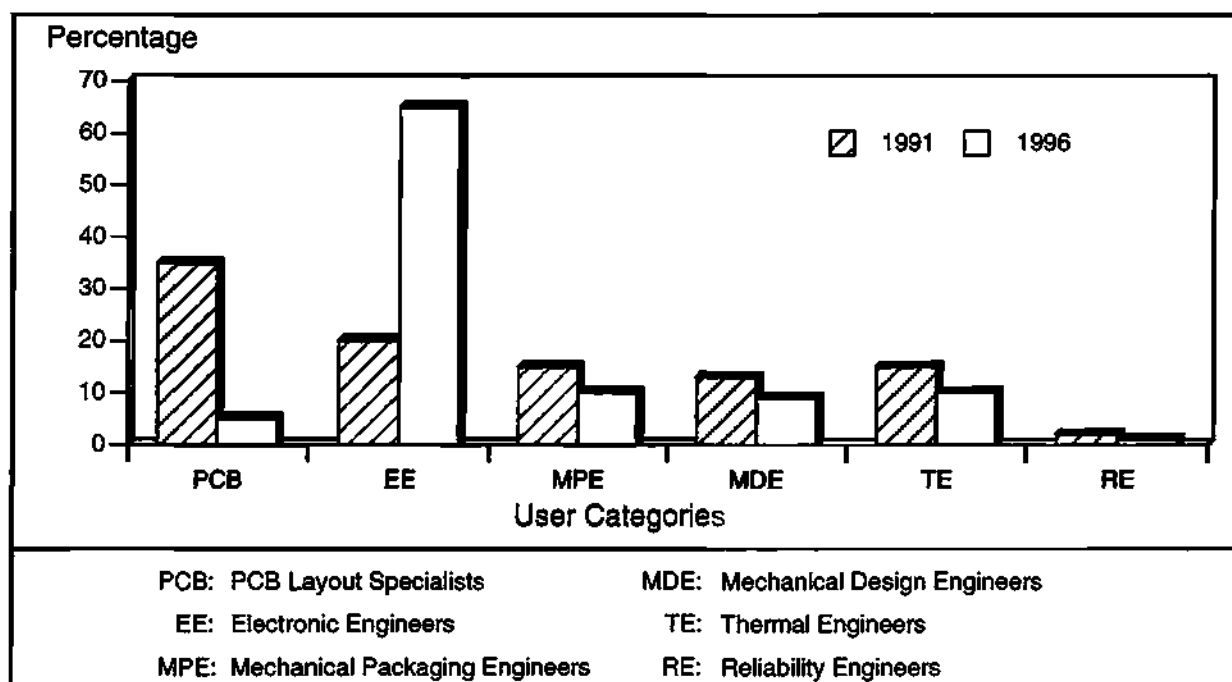
Market Drivers

Market demand for PCB thermal products will increase as thermal problems become more acute due to the following factors.

- Increasing clock speeds—Whenever a transistor switches between two voltage levels in a digital circuit, it briefly passes through a linear mode in which the power dissipated in the device rises sharply. As the operating frequency rises, devices spend an increasing proportion of the time in this high power state. For this reason, power dissipation (and therefore heat) rises with increased frequency.

Clock frequencies of electronic systems are forecast to rise tenfold during the next decade. Major thermal problems will result from this speed increase, driving the need for thermal analysis tools. For example, Digital

Figure 1
Changes in User Categories
(1991 to 1996)



Source: Dataquest (August 1992)

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Equipment Corporation's new Alpha microprocessor currently runs at a clock frequency of 200 MHz and dissipates a very hot 30 watts of power (higher than most circuit board soldering irons). A 1-GHz version planned for 1994 will dissipate 175 watts.

- **Multichip modules**—Multichip modules (MCMs) are characterized by several naked dice mounted very close together in a confined space. Couple this with another characteristic of MCMs—high operating frequencies—and severe thermal problems result. Thermal problems are intensified through the growing use of solder-bump flip-chip device packaging and assembly, since the major heat-transfer path is through the solder bumps. These problems have led to the use of thermal vias in MCM substrates—the required numbers and locations of which are difficult to calculate manually.

For these reasons, we believe that thermal analysis is indispensable for MCM design, which will provide a significant boost to the thermal analysis market.

- **Miniaturization**—From 1985 to 1991, the size volume of comparable computing equipment

reduced thirtyfold. Similar size reductions were evident in many other electronic sectors. Equipment that was previously large enough to support internal fans are now too small. Heat-sink areas and cooling-air volume are correspondingly reduced—yet clock speeds continue to increase. As a result, thermal problems multiply.

- **New design methodologies**—As engineers and companies increase their use of EDA tools, company working practices will evolve in a direction that will expect comprehensive analysis of all aspects of a design. Release-control procedures will prohibit the release of any design information into manufacturing unless these analyses can be proven to have taken place. We believe that thermal analysis is an important part of product design and will be included in most large-company procedures. When this happens, use of the tools becomes mandatory.

We have discussed the market drivers in the context of the PCB thermal market. However, they apply equally to all three thermal sectors: IC, PCB, and system. Furthermore, we believe that increased use of tools at one level will

trigger increased use at other levels. For example, user companies that successfully analyze a PCB using PCB thermal tools will wish to carry the resulting thermal model forward in order to utilize it in a system level analysis. The three sectors, however, are not at the same stage in their technology/market development.

Market Sectors

Previously, military and aerospace companies have expressed the most interest in thermal analysis. From a market development perspective, these sectors presented a number of major obstacles, as follows:

- Both military and aerospace companies have been in decline throughout the past three years, and therefore present a reducing opportunity.
- Such companies take thermal issues very seriously. Usually, they employ thermal specialists located in an analysis department. These specialists must sign off company products from a thermal standpoint and are already using long-standing mainframe-based analysis methods as specified by both the company and the national defense authority. Certain problems result:
 - These analysis methods are difficult to change.
 - The thermal specialists basically disbelieve that workstation-based solutions can be sufficiently comprehensive.
 - They have no history of purchasing tools from EDA companies.
- The decision cycle is very long.
- EDA companies really wanted to sell thermal analysis tools to *EDA users*; however, these users were typically in different departments than the thermal specialists, which raised issues of organizational structure, standards and QA procedures, organizational politics, and shifting responsibilities for part of the thermal design. This is a no-win situation.

Today, telecommunications and computer companies are beginning to invest in thermal analysis—especially those involved in high-speed applications. Another sector that has recently shown a considerable interest in thermal analysis is industrial electronics, particularly for

factory automation applications involving harsh environmental conditions.

Recent Dataquest end-user research showed the following:

- Sector companies most likely to have thermal analysis tools now:
 - Mainframe computers (especially in North America)
 - Aerospace/military (especially in North America)
 - Industrial control (especially in Japan)
- Sectors with the biggest need for thermal analysis tools (these include the above sectors with the following additions):
 - Automotive (worldwide)
 - Consumer electronics (Japan)
 - Telecommunications (Europe and Japan)
- Sectors most likely to have no thermal analysis tools at this time (very low penetration):
 - Printers/plotters (worldwide)
 - Test instruments and equipment (worldwide)
 - Automotive (Japan)

Two key opportunity sectors raised by this research are the automotive sector in Japan, which is surprisingly unpenetrated by thermal analysis tools, and the consumer electronics sector. The requirements for thermal analysis tools by consumer electronics companies are often overlooked by tool suppliers. Consumer companies must ensure that they can produce highly reliable products in very large volumes. Furthermore, these products must operate under extreme conditions—anywhere from Finland in December to Las Vegas in July. This is a formidable task and implies a considerable investment in thermal analysis.

Market Size and Forecast

We estimate the PCB thermal analysis market to be valued at \$6.9 million in 1991, corresponding to 303 unit shipments. However, we believe that 10 to 15 percent of these shipments are not actively used at this time. Many copies of PCB thermal analysis software have been bundled

into large orders or have been purchased for evaluation and curiosity reasons. A significant number of these licenses have never been used. As indicated in the above analysis, we expect this to change as the use of these kinds of analysis tools becomes mandatory in many organizations. Figure 2 shows the market growing to \$27 million by 1996, representing a compound annual growth rate of 31 percent.

Dataquest Perspective

The PCB thermal market is relatively small in relation to the overall EDA market, but we anticipate that it will exhibit growth well above the EDA average throughout the next several years.

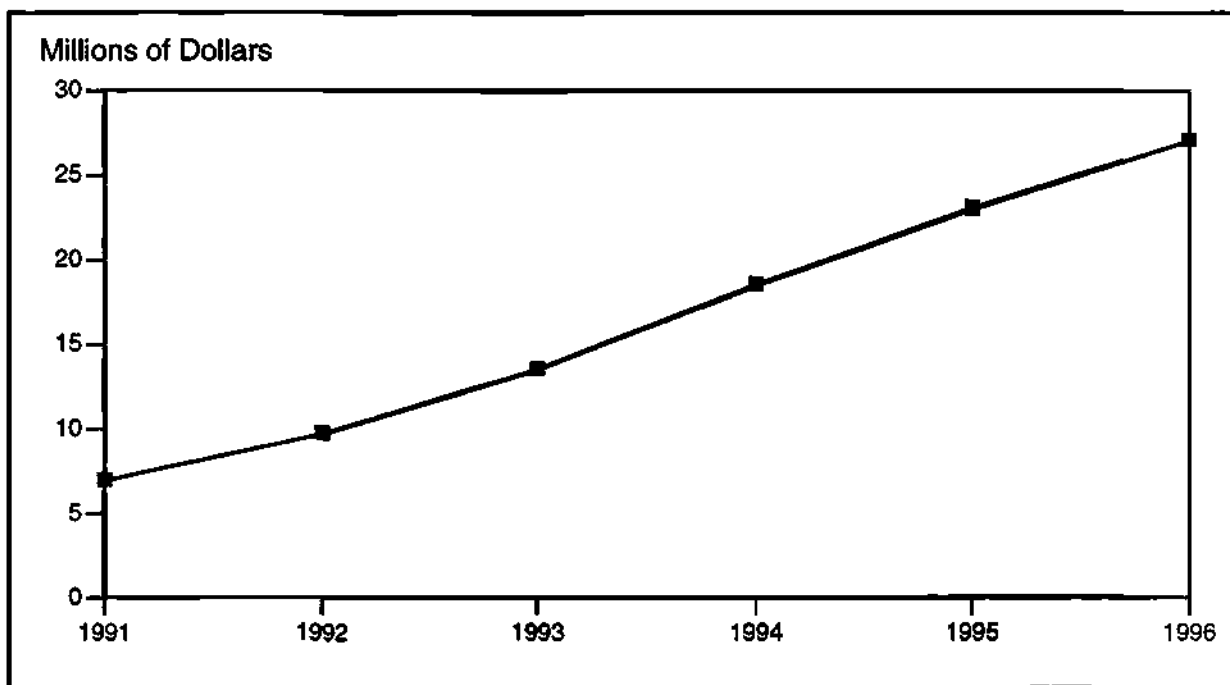
We believe that the PCB thermal market will increasingly be dominated by the broad-line EDA vendors, which own the EDA customer bases and are best positioned to integrate their own thermal products into their EDA tools. This is therefore a very difficult market for new specialized thermal companies to compete in—unless their products offer unique advantages such as ease of use, accuracy, utility, or integration with systems-level thermal products.

Considered individually, thermal analysis may continue to be unprofitable for larger EDA vendors. This may be unacceptable to highly divisionalized or low-profit companies, which may ultimately off-load product development and second-line support to specialized third-party companies, preferring to sell the products on an OEM basis. The EDA vendor will then assist these companies through framework initiatives.

We believe that opportunities *do* exist for EDA companies, but the decision depends on the importance of a thermal analysis capability to the strategic direction of the individual company. This raises another question: Why should an EDA company view thermal analysis as being more or less strategic than any other analysis tool? A possible answer is that thermal analysis tools, uniquely, have many possible users throughout the organization. They could therefore open the door into other departments and functions. A more tactical reason is that a company with a large PCB layout and CAE customer base could sell a considerable number of thermal analysis licenses into that base—if the product adequately meets users' needs and if the EDA vendor can overcome the barrier of organizational politics.

By Jim Tully

Figure 2
PCB Thermal Market Forecast Software Revenue



Source: Dataquest (August 1992)

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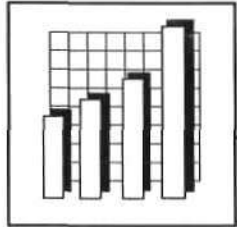
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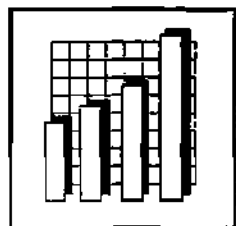
Market Trends

CAD/CAM/CAE
Electronic Design Automation

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Electronic Design Automation



Market Trends

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Chapter 1

Report Overview

Report Organization

This report is part I of a two-part series on the electronic design automation (EDA) applications market. Part II, entitled *Market Outlook*, will be available soon after the publication of this report.

This report, *EDA Applications: Market in Review*, represents the results of Dataquest's research of the 1991 EDA applications market. It provides analyses of the electronic CAE, PCB/MCM, and IC layout markets, as follows:

- **Executive Summary**—Presents the overall EDA market in terms of past and future performance, as well as global trends and the future restructuring of the EDA industry
- **Subapplication market chapters**—Each subapplication chapter consists of the following:
 - **1991 Year in Review**—Provides an analysis of factors stimulating market growth in each of the defined submarkets. Includes highlights of achievements of the market leaders and recaps historical consumption patterns by region
 - **Market Segmentation**—Chapter 3: "CAE Market" and Chapter 5: "IC Layout Market" include market segmentation sections that present Dataquest's analysis of subapplications and areas of special interest
 - **Dataquest Perspective**—Provides insight into general trends in each market and specific areas to watch for future opportunities

Data Collection Process

Dataquest uses both primary and secondary sources to produce our market share and forecast data. We use measures of both supply-side and demand-side data in the forms of surveys and audits. In addition, Dataquest analysts have many years of experience applying this information—in conjunction with opinions developed through industry contacts—to get the most accurate information possible.

Demand-Side Data

Dataquest demand-side (end-user) data are gathered using an extensive survey technique. End users are identified through the registered user and prospect lists of EDA and ASIC companies. Surveys were

distributed throughout North America, Europe, and Japan, enabling Dataquest to gather a snapshot of electronic design methodology and usage trends. Relying upon Dataquest's international expertise, surveys distributed in Japan were translated into kanji, the Japanese character set, in order to improve the survey's accuracy. Dataquest received statistically significant numbers of responses in all areas and bases current and future end-user trends upon these data.

Supply-Side Data

In the fourth quarter of each year, Dataquest surveys all major participants in the EDA industry to obtain preliminary market share data. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contact at large companies. Examples of the job titles of people contacted for information are the following:

- President and CEO
- Vice President and General Manager
- Vice President of Marketing
- Vice President, Strategic Product Planning
- Director of Strategic Planning
- Director of Marketing
- Director of Market Development
- Manager, CAD/CAM/CAE Marketing Programs
- Market Research Analyst

We resurvey select companies during the second quarter of the following year to verify final annual results and determine the CAE granularity. The information in this document is based upon these final market share data.

Data supplied by vendors are evaluated against information drawn from many sources including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice and checks with multiple sources at one company to cross-check data on that company.

We believe that the estimates presented here are the most accurate generally available today. Dataquest's EDA market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture, and this is particularly useful when comparing regions or applications.

Chapter 2

Executive Summary of the EDA Market —

Highlights

1991 EDA Vendor Turmoil Portends Shift in Business Models

1991 was a year of contrasts. The EDA market seemed to be a microcosmic reflection of the political revolution and warfare that marked the world in 1991. Large, established companies seeking to bring to market a global revolution in design automation stumbled as younger, quicker upstarts gained advantage through acquisition and technology leadership. Mentor Graphics' delinquency in shipping its 8.0 product exemplifies the peril of focusing on "wall-to-wall" product development. Dataquest believes that this has made it very difficult for EDA vendors to develop and sustain a competitive edge on a complete portfolio of products. Rather, by selectively taking the best technology from a wide variety of outside sources and integrating such technology into effective EDA solutions, large EDA vendors may best remain successful.

Cadence's approach to market dominance has been through acquisition. Originally created through the merger of ECAD and SDA, Cadence continued acquisitions of key technologies, including Tangent (Automatic Placement and Routing Software), Gateway Design Automation (Verilog Simulation), and at the very end of 1991, the merger with Valid Logic Systems. This imperialistic program has made the combined entity of Cadence and Valid the No. 1 supplier of EDA software. Because the culmination of the merger did not occur until December 31, 1991, Dataquest lists Valid and Cadence as separate entities.

Frameworks and Standards Emerge to Level Playing Field

At this time there are no industrywide standards under which EDA application vendors may develop tools. However, the infrastructure of EDA design, frameworks, and standards, had begun to coalesce in 1991.

The two largest suppliers of EDA tools, Mentor Graphics and Cadence, both shipped improved versions of their frameworks, Falcon and Design Framework II, respectively. These products have now achieved a critical mass so that other, smaller developers of EDA tools may utilize the framework's capabilities to integrate their

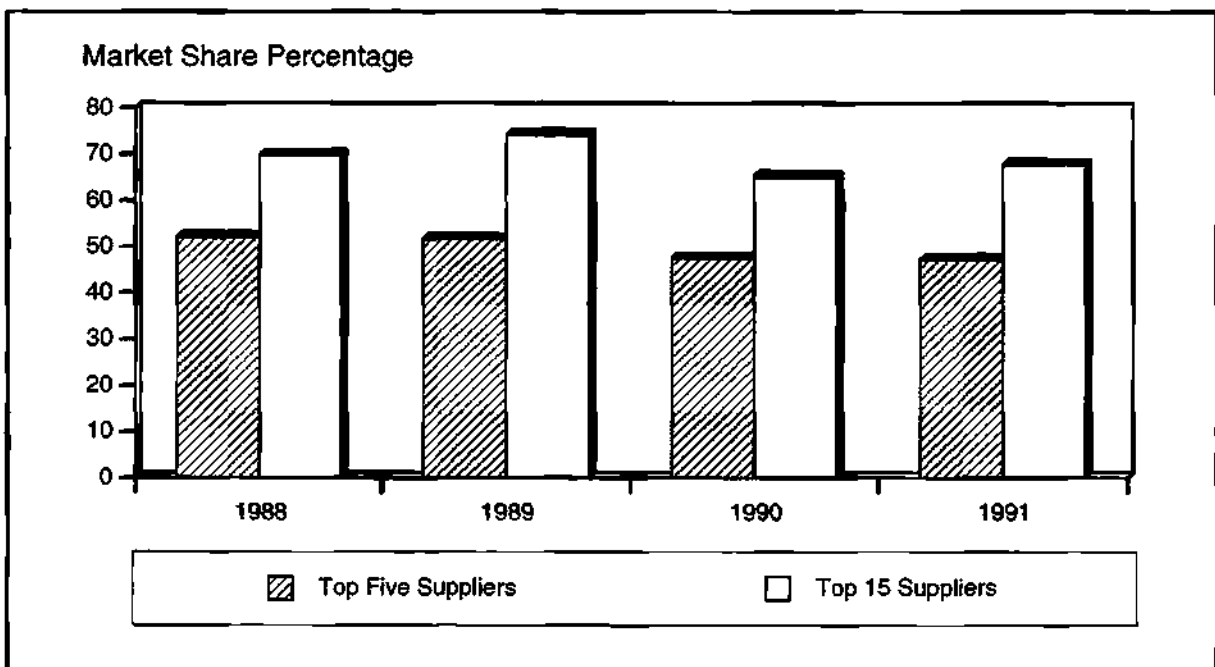
own technology seamlessly into the design methodology of the end user. Boosting the smaller developer is the increasing acceptance of Verilog and VHDL as common vehicles for model development. The emergence of common HDLs, in conjunction with robust frameworks from large EDA suppliers, will allow niche players to compete more aggressively against point tools from larger suppliers, effectively leveling the playing field.

This leveling of the EDA market is just beginning to manifest itself. Examining the EDA software market share garnered by the top 5 and top 15 vendors, shown in Figure 2-1, reveals a startling trend. While the past four years has been ripe with consolidation and mergers, the total market share gleaned by leading vendors has decreased. Dataquest anticipates that this trend will continue as large EDA providers begin to shift their business models.

IC Layout Leads EDA Market Growth

Not surprisingly, the sector of the EDA area least affected by company turmoil posted the greatest gains in 1991. IC Layout software grew by 6.2 percent in 1991, outperforming overall EDA software growth of 3.8 percent, as shown in Figure 2-2. Electronic CAE software posted a disappointing 4.9 percent growth, as product shipment delays and price erosion began to take its toll upon the market. PCB/MCM/hybrid was essentially flat, showing signs of maturation.

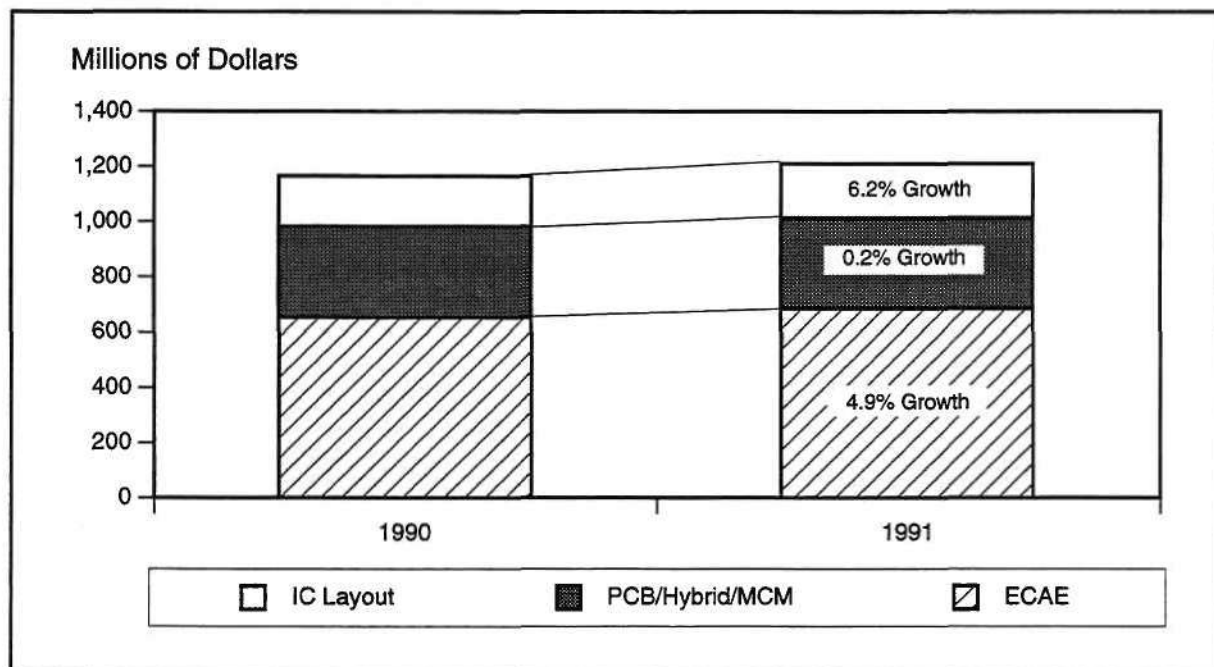
Figure 2-1
EDA Software Market Share, by Top Suppliers



Source: Dataquest (October 1992)

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Figure 2-2
EDA Software Market Revenue



Source: Dataquest (October 1992)

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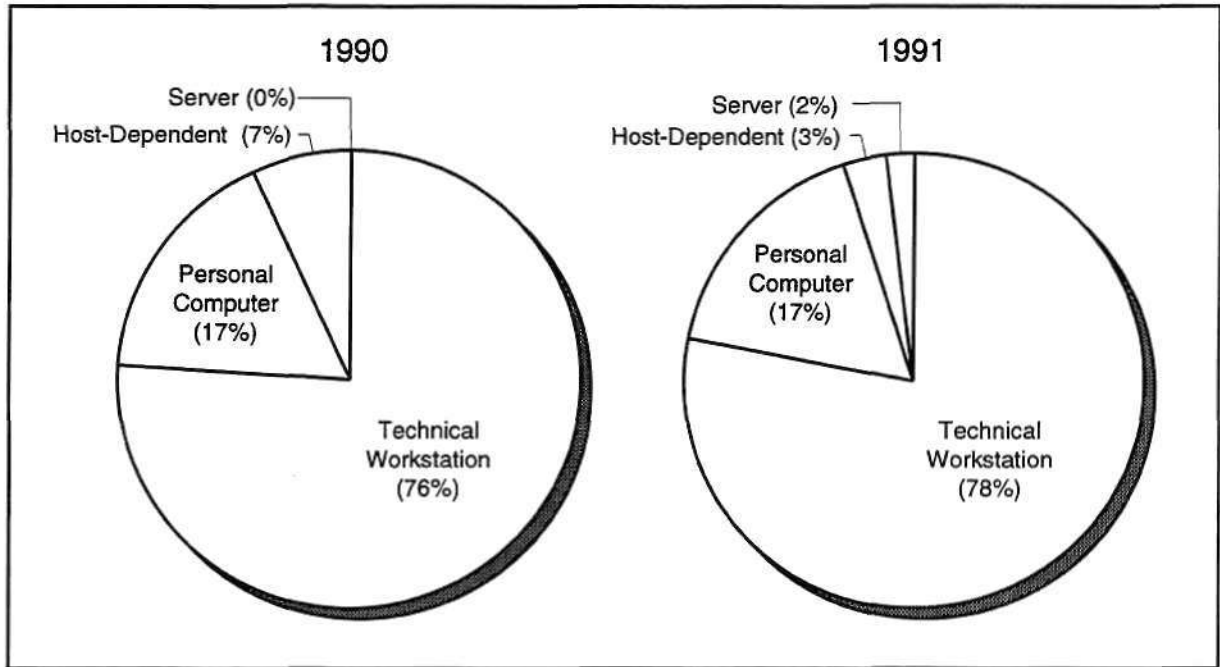
Technical Workstation Dominance

The EDA industry's preferred platform is the technical workstation. The percentage of software shipped to this platform continues to grow, as illustrated in Figure 2-3. In the eyes of the electronic designer, UNIX-based workstations have almost reached the point of being a commodity, with almost all EDA suppliers supporting multiple workstation platforms. However, the coming of Microsoft's Windows NT may shift the operating system—if not the actual hardware—that the EDA user purchases. It is important for EDA vendors to continue to monitor the developments of Windows and its success in penetrating the technical workstation marketplace.

EDA Worldwide Market Share

EDA, as an industry, has matured to the point of stable growth rates of 4 to 10 percent. In 1991 we saw the EDA market turn in a dismal 3.8 percent growth, a far cry from the boom years of EDA, which saw 40 and 50 percent growth rates in 1986 and 1987. The year 1991 was a transition period as the two leading software vendors, Mentor Graphics and Cadence, were busy developing their next-generation design tools (see Table 2-1). The combination of the Gulf War, economic recession, and product transitions caused a stall of EDA purchases.

Figure 2-3
Worldwide EDA Software Shipments, by Platform



Source: Dataquest (October 1992)

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Table 2-1
1991 Worldwide EDA Software Market Share

Company	Software Revenue (\$M)	Market Share (%)
Cadence	184.3	15.2
Mentor Graphics	146.4	12.1
Valid	108.5	9.0
Racal-Redac	70.6	5.8
Zuken	62.3	5.1
Intergraph	44.7	3.7
Viewlogic	32.0	2.6
Synopsys	30.1	2.5
Wacom	25.5	2.1
Compass Design	23.9	2.0
Autodesk	22.4	1.9
Harris EDA	19.1	1.6
EEsof	18.1	1.5
Fujitsu	16.7	1.4
Xilinx	16.2	1.3
All Companies	1,210.0	100.0

Source: Dataquest (October 1992)

Dataquest Perspective

The EDA market's languid performance in 1991 is the result of a culmination of factors. Global economic recession, company-specific product transitions, and continued fragmentation all combined to slow growth. Yet there are bright spots in the gloom, including the continued acceptance of top-down design methodology for ASIC design, testability improvements, and programmable logic design tools. Further detailed analysis into these issues is provided in subsequent chapters of this report.

Chapter 3

CAE Market

1991—The Year in Review

Introduction

Nowhere is the turbulence of the EDA industry more apparent than in the CAE application area. While on the surface CAE software showed a lackluster 4.9 percent growth between 1990 and 1991, this cannot be wholly attributed to economic recession. Company and product dynamics combined to slow potential growth; but, Dataquest believes that the CAE market is on the threshold of renewed growth opportunities.

Market Segmentation

Electronic CAE tools are used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Dataquest further segments CAE applications by market and by application. For example, a schematic entry system (which is defined as an application) may be used for describing ASIC logic, PLD logic, or board-level design (which are defined as markets). Dataquest gathers estimates of usage for each application to arrive at the final numbers. The applications are defined as follows:

- **Digital Design**—Summation of schematic entry, high-level design entry, and library revenue for digital design products
 - **Schematic Entry**: graphical entry of gate-level design information
 - **High-Level Design**: predominately HDL-based entry and source-text-debugging tools
 - **Libraries**: includes symbol and simulation models
- **Design Verification**—Summation of simulation and static timing analysis
 - **Simulation**: contains both gate-level and mixed-level functional and timing simulation products
 - **Timing Analysis**: consists of timing verification tools, including static and dynamic timing analysis
 - **Logic Synthesis**: consists of gate-level synthesis

- **Test Automation**—Summation of automatic test vector generation (ATVG), test logic synthesis, and fault simulation
 - **ATVG**: includes those tools called automatic test pattern generators (ATPGs) and test pattern compactors, as well as ATVG products that do some limited scan register insertion.
 - **Test Logic Synthesis**: tools used in design-for-test strategies. These products produce testable structures and are not limited to scan register insertion.
 - **Fault Simulation**: products that determine fault coverage and/or provide information regarding the testability of a design.
- **Other Digital**—Includes such products as data translation and design management tools
- **Analog Design**—Summation of analog design tools sold for design entry and design verification
- **Design Entry**—Summation of analog schematic capture and library sales
 - **Schematic Entry**: graphical entry of gate-level design information
 - **Libraries**: includes analog symbol and simulation models
- **Design Verification**—Summation of analog and mixed signal simulation markets
 - **Circuit Simulation**: analog simulation products, including SPICE simulation
 - **Mixed-Signal Simulation**: simulators design for mixed analog/digital simulation
- **Other Analog Design**—Includes such products as data translation and design management tools

Design Entry

Growth in the design-entry area is being fueled by the emergence of HDL-based design. Clearly, schematic capture, used for gate-level design, is a stagnant market. High-level design entry, primarily for Verilog HDL and VHDL design, has more than doubled since 1989, as shown in Table 3-1.

Libraries continue to be the most significant problem facing design teams, but the market has yet to bring about a successful company. We believe that the sluggishness can be traced to the following sources:

- Users do not expect to pay much for models.
- The breadth of models required to meet the markets needs is so wide that it is difficult for third-party modeling companies to operate.

Table 3-1
Worldwide CAE Software Revenue, by Application and Market
(Millions of Dollars)

	1989 Total	Board	ASIC	FPGA/ PLD	1990 Total	Board	ASIC	FPGA/ PLD	1991 Total	Board	ASIC	FPGA/ PLD
Electronic CAE	584.98	264.20	271.45	49.33	653.79	290.50	304.56	58.73	685.79	303.77	314.02	68.00
Digital Design	469.38	172.38	247.66	49.33	513.07	203.61	250.72	58.73	535.79	207.21	260.58	68.00
Design Entry (Digital)	215.98	102.46	82.78	30.75	234.77	120.98	83.55	30.24	231.60	125.01	77.88	28.71
Schematic Entry	160.54	72.22	65.32	23.01	159.65	84.12	53.01	22.51	142.06	82.63	40.36	19.07
HDL Entry	20.05	9.89	4.81	5.34	35.70	13.16	17.22	5.32	46.53	16.70	24.28	5.56
Libraries (Digital)	35.39	20.34	12.65	2.40	39.43	23.70	13.32	2.41	43.01	25.68	13.25	4.08
Design Verification (D)	177.62	46.33	117.84	13.45	185.84	63.09	110.52	12.22	198.46	61.87	116.98	19.61
Simulation	161.06	43.05	104.62	13.39	170.80	59.58	99.06	12.16	179.79	58.20	105.38	16.21
Static Timing Verification	16.56	3.28	13.22	0.06	15.04	3.51	11.47	0.06	18.67	3.66	11.60	3.40
Logic Synthesis	16.68	0.00	13.68	3.00	45.08	0.00	30.96	14.12	53.53	36.61	16.92	16.92
Test Automation	37.97	11.64	25.06	1.27	30.21	9.26	20.00	0.95	30.24	6.72	22.39	1.13
Automatic Test Vector												
Gen.	9.84	1.94	7.14	0.76	10.58	2.00	7.75	0.83	11.93	2.33	8.61	1.00
Test Logic Synthesis	3.71	0.38	2.82	0.50	3.48	0.40	2.98	0.11	6.09	0.37	5.61	0.11
Fault Simulation/Grading	24.43	9.32	15.10	0.01	16.14	6.86	9.27	0.01	12.21	4.03	8.17	0.02
Other Digital	21.13	11.96	8.30	0.87	17.16	10.27	5.69	1.20	21.97	13.62	6.72	1.64
Analog Design	115.60	91.82	23.78	NM	140.72	86.89	53.83	NM	150.00	96.56	53.44	NM
Design Entry (Analog)	40.61	31.03	9.58	NM	57.26	34.93	22.32	NM	60.28	38.67	21.61	NM
Schematic Capture	25.85	21.70	4.15	NM	38.97	27.09	11.88	NM	42.41	30.13	12.27	NM
Libraries (Analog)	14.76	9.33	5.43	NM	18.29	7.84	10.45	NM	17.87	8.53	9.34	NM
Design Verification (A)	66.80	52.86	13.93	NM	75.09	44.22	30.87	NM	78.66	47.97	30.69	NM
Circuit Simulation	64.92	51.68	13.24	NM	65.57	40.62	24.95	NM	66.85	42.72	24.13	NM
Mixed-Signal Simulation	1.87	1.18	0.69	NM	9.52	3.60	5.92	NM	11.81	5.25	6.56	NM
Other Analog	8.20	7.93	0.27	NM	8.38	7.73	0.64	NM	11.06	9.92	1.14	NM

NM = Not meaningful

Source: Dataquest (October 1992)

Semiconductor vendors are in the best position to provide models, yet they are reluctant to do so, as they feel it has limited impact on their bottom-line financials. As proof, witness the recent Digital Equipment Corporation/Cadence announcement on the Alpha chip model. While Digital did lend its chip expertise, it is Cadence that is doing the sales and marketing of the model.

Design Verification

Observing 1989 through 1991, digital design verification seem to be as stagnant as schematic capture. However, there is an interesting dynamic taking place underneath the top-line numbers. Gate-level simulators are being swapped out by mixed-level simulators, which correlates to the rapid growth in HDL-design entry tools.

Static timing analysis continues to stumble due primarily to technical limitations. The tools to date have not been effective at separating erroneous timing problems from actual timing issues.

Logic Synthesis

Clearly, logic synthesis has been the shining star for the past three years. Synopsys is the dominant player in the market and rode the synthesis wave into a wildly successful initial public offering in 1992. Piggybacked onto the success of logic synthesis has been high-level design entry and mixed-level simulation. In 1991 we saw a reduction in the hypergrowth previously experienced as new offerings from a slew of software vendors introduced pricing pressure and longer product-evaluation cycles.

Test Automation

Test automation continues to bump along at the \$30 to \$40 million range. Fault simulation took a big hit as its main industry sector, Military and Aerospace, suffered from the "peace dividend."

Even with its lackluster performance, the test automation market has been inundated with new products aimed at ATPG and test-logic synthesis. The apparent lack of growth can be attributed to the following factors:

- The tools and technologies offered to the market are expensive and limited in scope.
- The tools and technologies offered to the market have thus far not been well-integrated into the design flows and environments of electronics manufacturers.
- The primary market has been ASIC design, and the average size of ASIC design has just recently crossed the 20,000 gate mark. Thus, the need for advanced tools has been limited.
- Except within the Military and Aerospace market, test traditionally has not been built into the design methodologies of electronics manufacturers.

In 1991 Dataquest saw flat year-to-year growth; however, we believe that this is the end of the dive in test automation. While fault simulation continued to steadily decline, test logic synthesis and automatic test vector generation showed healthy growth, signifying that a vendor critical mass been achieved, and users are beginning to think seriously about purchasing test automation tools.

Analog CAE

Analog CAE growth outpaced digital tool growth and continues to contribute to approximately 20 percent of the total CAE applications market. The past three years has seen significant sales of analog tools in Asia, bringing that region's consumption of analog tools in line with its consumption of analog components.

ASIC

The digital ASIC segment fell slightly between 1989 and 1990, primarily due to the saturation of schematic entry and gate-level simulation, and the steep learning curve of next-generation top-down design methodologies. However, we believe that the ASIC segment of the market will expand with the advent of new HDL-based design verification and entry systems. Indeed, 1991 sees a slight upturn in the ASIC segment, driven by logic synthesis and simulation tools.

PCB

Growth in the PCB market was driven by those areas stagnant in its ASIC counterpart, namely design verification and entry. This dynamic is caused by the advances in the ASIC area spilling into the PCB world. It is therefore no small surprise that companies based heavily in ASIC and IC design, namely Mentor Graphics and Cadence, have shown marked advances in the PCB/MCM/hybrid market. We anticipate that the trend toward increased usage of CAE software for board design will continue during the next three years. Areas that will drive this growth are signal integrity tools, primarily timing analysis, transmission line effect, thermal analysis, and EMI. Following these point tools will be the next-generation opportunity, electronic systems design automation (ESDA).

PLD/FPGA

Unlike the ASIC CAE software market, the programmable logic device (PLD) and field-programmable gate-array (FPGA) design-tool market continues to show healthy growth. The increasing level of acceptance of FPGAs by the design community is translating into a greater need for sophisticated design tools.

Historically, programmable logic tools have been simple boolean equation or gate-level schematic capture and synthesis systems, provided by the PLD supplier or just a handful of third-party tool suppliers. Simulation was used to a very limited extent, due to the simplistic and reprogrammable nature of these devices. However, by 1991 we see a broader use of simulation and third-party tools. While

proprietary tools (tools supplied by PLD/FPGA vendors) fueled software growth, as shown in Figure 3-1, the market for third-party tools has begun to expand. This will continue as PLD suppliers begin to rely upon larger EDA vendors for simulation and synthesis expertise.

Shipments

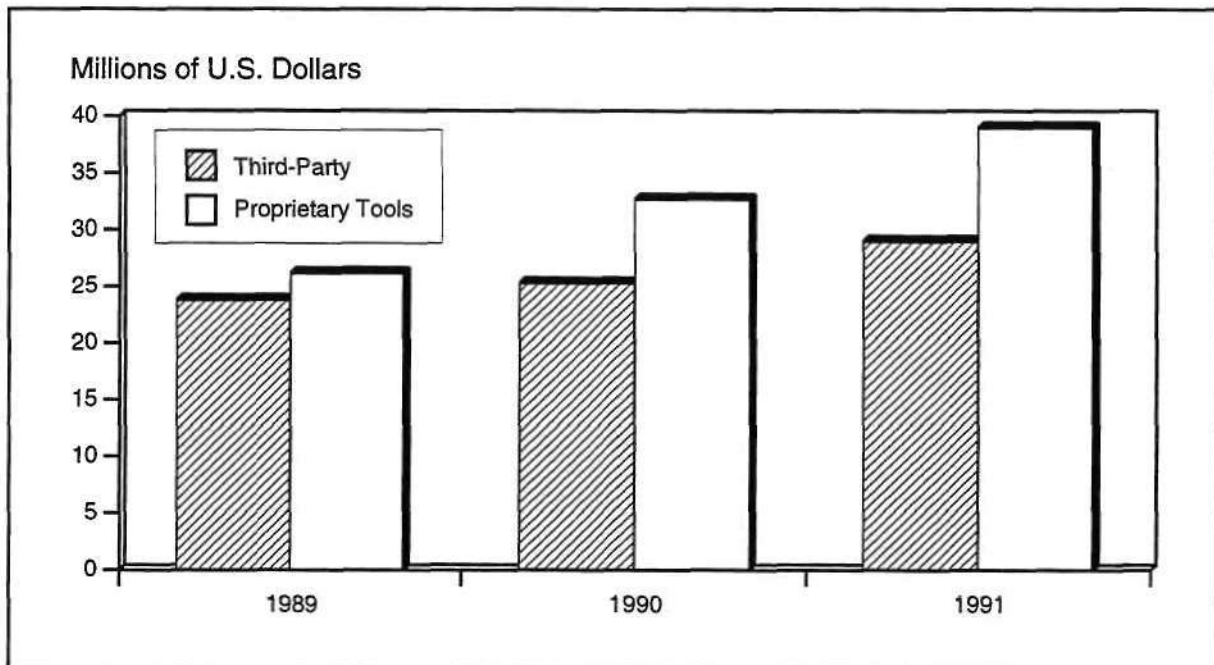
Table 3-2 documents the regional consumption of CAE software and service during the past four years. As noted in Figure 3-2, regional consumption has not changed dramatically during the past year, with North America being the largest user of CAE tools. The Asian market is growing as a percentage of the total market, as Japanese companies continue to switch from internal CAE tools to purchasing commercial CAE tools.

As a historical trend, services has begun to outgrow software sales worldwide, with a compounded annual growth rate (CAGR) of 15 percent between 1988 and 1991, compared to just 10 percent CAGR for CAE software. Services will play a more important role as larger EDA companies transition from providing point tools to servicing clients overall electronic design needs.

Market Share

The year 1991 marks a watershed point in the CAE industry. Mentor Graphics' delay in executing upon its 8.0 strategy is readily apparent in its spiraling market share, now at just above

Figure 3-1
PLD/FPGA Software Revenue, by Vendor Type



Source: Dataquest (October 1992)

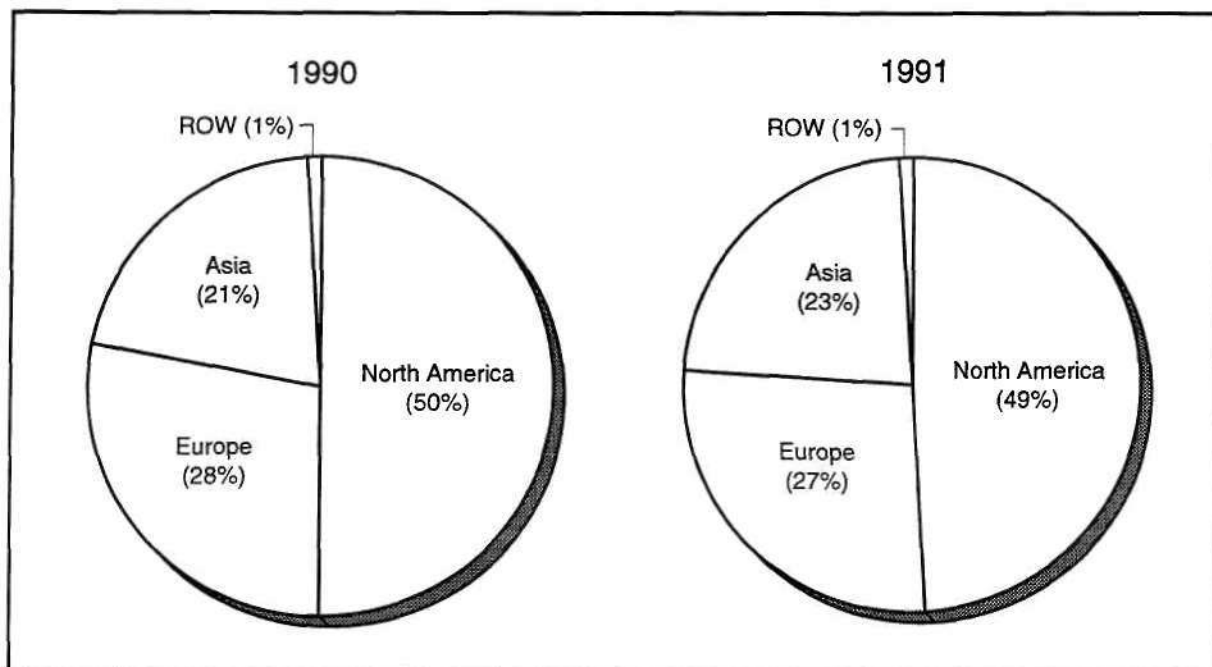
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Table 3-2
CAE Software and Service Consumption, by Region
(Millions of Dollars)

	1987	1988	1989	1990	1991
All Platforms, Worldwide					
Software	396	458	600	654	686
Service	141	192	237	297	315
North America, All Platforms					
Software	177	231	294	331	336
Service	71	97	119	141	157
Europe, All Platforms					
Software	128	131	158	179	186
Service	40	60	80	99	98
Asia, All Platforms					
Software	88	92	144	138	158
Service	29	33	36	53	58
ROW, All Platforms					
Software	3	4	4	5	6
Service	2	2	2	3	3

Source: Dataquest (October 1992)

Figure 3-2
CAE Software Consumption, by Region



Source: Dataquest (October 1992)

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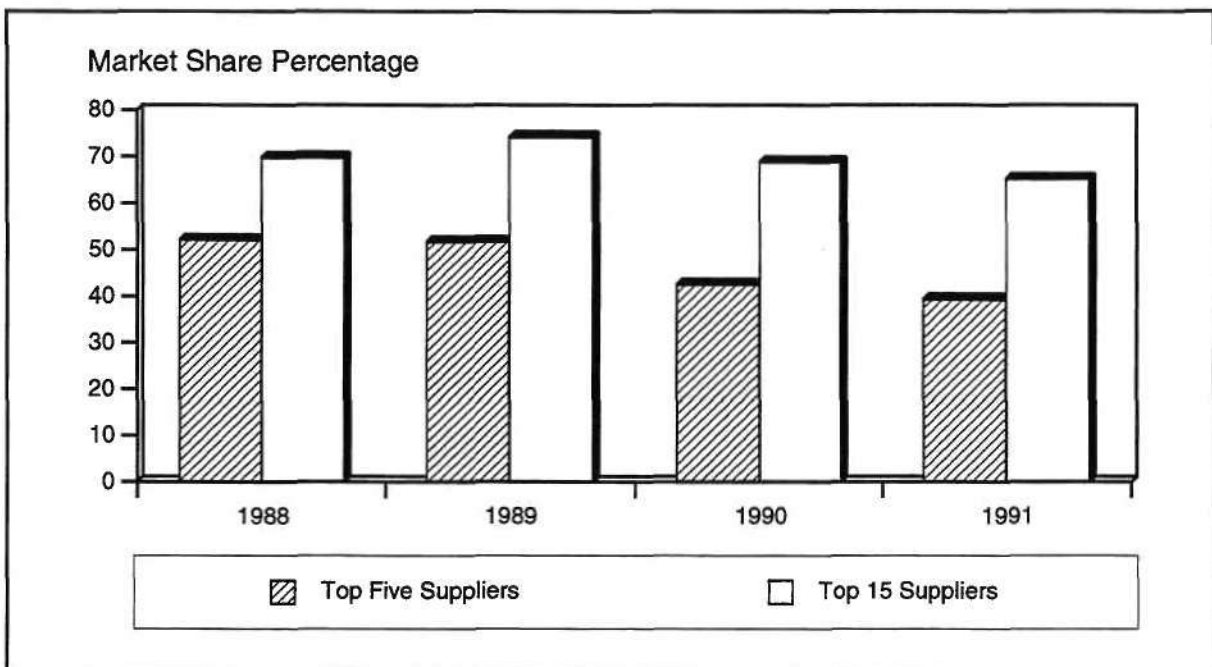
10 percent. Once the market leader, it now is No. 2 behind the merged share of Cadence and Valid. The merger of Cadence and Valid did not take effect until the very end of 1991, and therefore Dataquest tracked each company's revenue separately.

The Cadence/Valid merger marks the high point of Cadence's seemingly "market-share-by-acquisition" strategy, and positions it as a technology-rich company. Cadence now faces the daunting challenge of merging each company's successful products into a unified design environment, a task that Mentor Graphics has recently completed with its 8.0 product.

Yet while these large companies continue to struggle with internal development issues, a slow revolution is gaining momentum as lithe young companies, based upon technical or niche expertise, show exciting growth.

These companies caused significant turbulence in the CAE market and may be recognized by summing market share held by top CAE vendors. While the market has grown 58 percent during the past four years, the total market share garnered by the top five suppliers has diminished each year, to the 1991 number of 39 percent, as shown in Figure 3-3 and Tables 3-3 and 3-4.

Figure 3-3
Worldwide CAE Software Market, by Top Suppliers



Source: Dataquest (October 1992)

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Table 3-3
CAE Software Market Share Ranking, 1988 and 1989

Year Rank	Company	Software Revenue (\$M)	1988 Market Share (%)	Company	Software Revenue (\$M)	1989 Market Share (%)
1	Mentor Graphics	94	22.9	Mentor Graphics	115.4	20.2
2	Daisy Systems	47.7	11.6	Valid	68.6	12
3	Valid	39.9	9.7	Dazix	52.7	9.2
4	Teradyne	18.1	4.4	Cadence	38.8	6.8
5	LSI Logic	14.3	3.5	Racal-Redac	20.2	3.5
6	Futurnet	12.7	3.1	EEsof	16.2	2.8
7	VLSI Technology	12.4	3	Teradyne	16.1	2.8
8	Racal-Redac	9.9	2.4	Viewlogic	15.1	2.6
9	Silicon Compiler Systems	8.2	2	Autodesk	14.2	2.5
10	Cadence	7.7	1.9	Xilinx	13.5	2.4
11	Hewlett-Packard	5.9	1.4	LSI Logic	13.3	2.3
12	NEC	5	1.2	Hewlett-Packard	10.8	1.9
13	Silvar-Lisco	3.8	0.9	VLSI Technology	10.1	1.8
14	Prime Computer	3.6	0.9	Wacom	9.8	1.7
15	Autodesk	3.5	0.9	Data I/O	9.7	1.7

Source: Dataquest (October 1992)

Table 3-4
CAE Software Market Share Ranking, 1990 and 1991

Year Rank	Company	Software Revenue (\$M)	1990 Market Share (%)	Company	Software Revenue (\$M)	1991 Market Share (%)
1	Mentor Graphics	104.6	16.2	Mentor Graphics	73.2	10.7
2	Cadence	68.3	10.6	Cadence	69.4	10.1
3	Valid	52.3	8.1	Valid	64.2	9.4
4	Dazix	26	4	Viewlogic	32	4.7
5	Synopsys	23.6	3.6	Synopsys	30.1	4.4
6	Viewlogic	23.1	3.6	Intergraph	27.4	4
7	Racal-Redac	22.5	3.5	Racal-Redac	28.5	4.1
8	EEsof	22.7	3.5	Wacom	25.5	3.7
9	Wacom	21.7	3.4	Autodesk	19.6	2.9
10	Autodesk	16.7	2.6	EEsof	18.1	2.6
11	Teradyne	15.5	2.4	COMPASS Design Automation-VLSI	16	2.3
12	Xilinx	14.8	2.3	Xilinx	16.2	2.4
13	Logic Automation	11.8	1.8	Logic Automation	14.2	2.1
14	Data I/O	10.8	1.7	Zuken	12.1	1.8
15	LSI Logic	9.8	1.5	LSI Logic	11.7	1.7

Source: Dataquest (October 1992)

This trend is the result of the increasing complexity of electronic design. No longer can a broad line supplier of schematic capture and simulation solve all of the difficult problems facing systems designers. There will continue to be more "boutique" shops, with smaller CAE vendors creating special focus tools, like signal integrity, mixed-level simulation, test vector generation, and other point tools to arm the designers with solutions to decrease their design cycle time.

Other trends apparent from the market share rankings include the following:

- The demise of proprietary gate-array tools. Only LSI Logic placed within the top 15, signaling the shift to third-party tools is now complete.
- The emergence of PLD/FPGA tools, from proprietary tools such as Xilinx, and nonproprietary tools from Data I/O.
- The emergence of Japanese software companies, Zuken and Wacom.
- The rise of Synopsys and Viewlogic, culminating in their highly successful initial public offerings (IPOs) in 1992.

Dataquest Perspective

The CAE market continued to show significant signs of strife in 1991, as product transitions and a changing ASIC design methodology combined to slow growth. However, this market is poised for expansion as the next generation of test, simulation, and synthesis tools become adopted by mainstream electronic designers.

Chapter 4

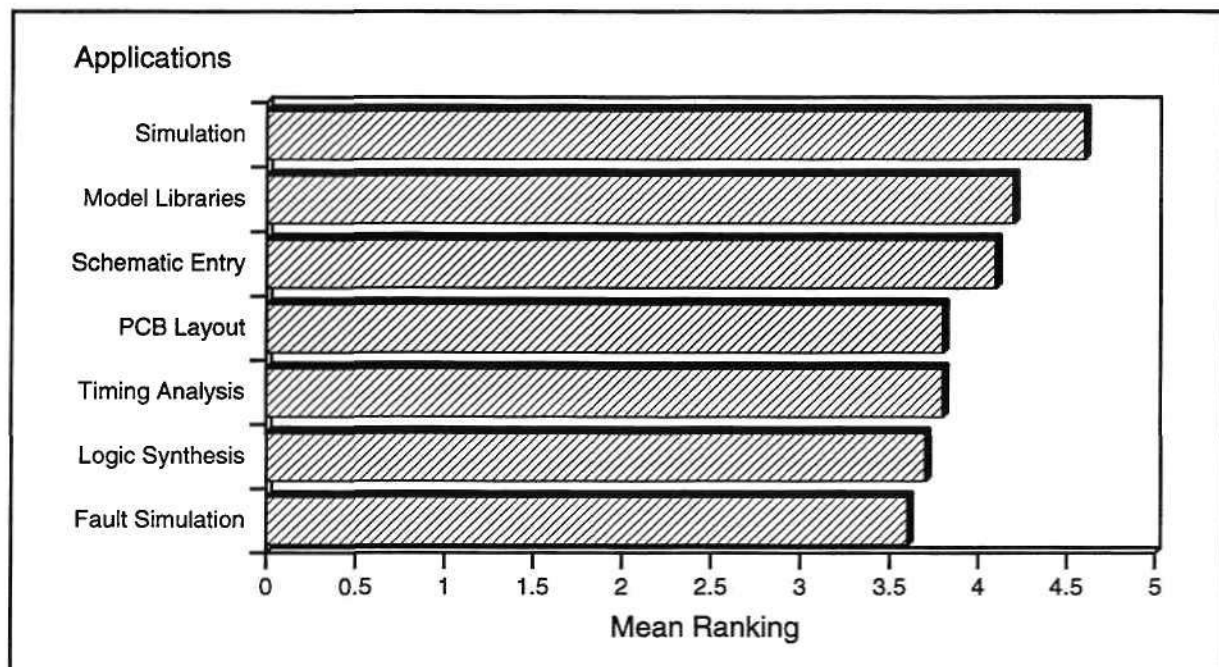
PCB Market

1991: The Year in Review

Introduction

The PCB/MCM/hybrid market continues to show signs of being a matured market. In 1991, it posted a flat software growth rate and has failed to generate much user excitement. Indeed, in a survey of electronic designers conducted by Dataquest, PCB tools were ranked fourth in importance by North American designers, behind simulation, model libraries, and schematic entry, as shown in Figure 4-1. In Japan, users of EDA tools rank PCB tools as seventh in importance, trailing the previously mentioned applications, as well as high-level design entry, timing analysis, test synthesis, and fault simulation.

Figure 4-1
North American Software Importance Rating, by Application



Source: Dataquest (October 1992)

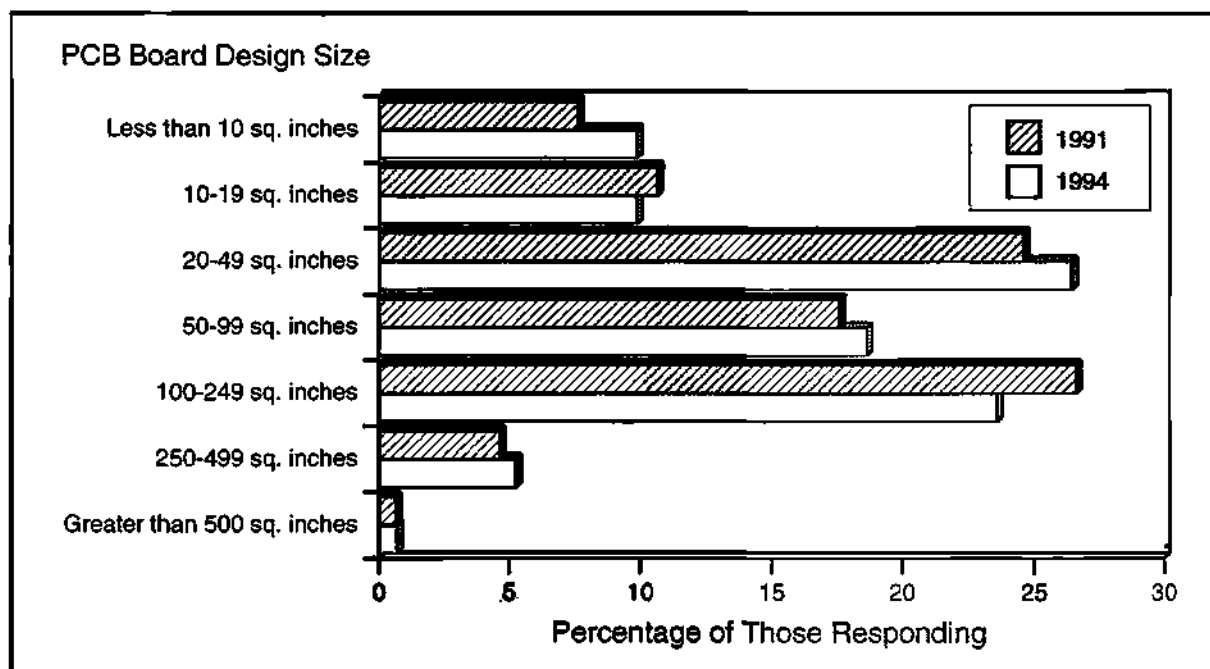
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Another factor contributing to the slow growth in PCB design tool growth is the lack of a widespread trend to decrease board size. While in the ASIC world, design start average gate densities continue to increase dramatically, requiring new productivity enhancement tools, Dataquest research has determined that board design sizes will not dramatically decrease. While consumer and portable communication devices will drive sizes downward, increase the complexity, and cause radical form factor changes, this is limited to relatively few companies, and overall design sizes will not decrease dramatically, as shown in Figure 4-2.

An emerging growth opportunity may be found in the MCM market. While still in its infancy, Dataquest anticipates that this market will post strong growth in the coming years. The three basic types of MCMs these tools will be targeting are as follows:

- **MCM-L (Laminated)**—Fabricated using typical PCB processes and materials; targeted at low-end applications requiring interconnect densities of 50 to 150 cm/sq-cm at up to 100 to 200 MHz; favored by that automotive industry because of its relatively low cost; typically uses chip-on-board (COB) assembly, wire-bonded to the substrate, then encapsulated for protection.
- **MCM-C (Ceramic)**—Ceramic substrates (both cofired and low-dielectric constant ceramics) offering economical interconnect densities between 100 and 250 cm/sq-cm; traditional thick-film hybrid process; favored by the Aerospace and Military sectors because of its ability to withstand harsh environments; COB and flip-chip assembly commonly used; metal encapsulated

Figure 4-2
North American PC Board Design Size



Source: Dataquest (October 1992)

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- **MCM-D (Deposited)**—Deposited wiring and dielectric on silicon, ceramic, or metal substrates; uses thin film processes for interconnect densities of 200 to 400 cm/sq-cm and above; TAB and flip-chip assembly; currently in development stages.

Existing PCB companies, such as Mentor Graphics, Cadence, Dazix, Racal-Redac, and Harris EDA offer MCM layout tools. Tough design issues associated with MCMs, including thermal management, signal integrity and parasitics, as well as testing issues, will challenge MCM design tool suppliers to provide innovative solutions to difficult design issues.

Shipments

Japanese designers may not place a great deal of importance on PCB layout tools, but Asia as a region continues to grow in its consumption of PCB/MCM/hybrid tools. In 1991, Asia consumed 46 percent of these tools, up from 39 percent just one year ago, as shown in Table 4-1 and Figure 4-3. Dataquest anticipates that this trend will continue as more electronic design and manufacture continues to shift eastward.

Market Share

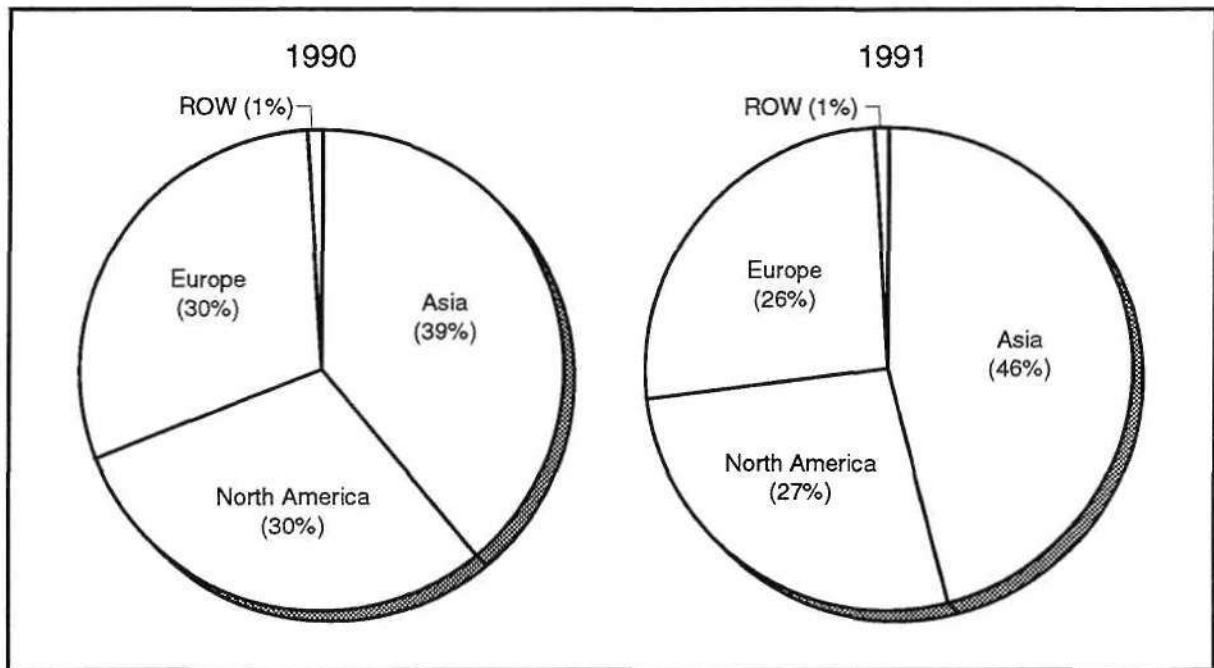
As Asia continues to grow in its consumption of PCB tools, Zuken, a Japanese supplier of PCB software, has climbed its way to becoming the largest supplier of PCB software, as shown in Tables 4-2 and 4-3. It is important to note, however, that Zuken's sales are

Table 4-1
PCB/MCM/Hybrid Software and Service Consumption,
by Region
(Millions of Dollars)

	1987	1988	1989	1990	1991
Worldwide All Platforms					
Software	267	295	304	328	328
Service	110	133	146	176	186
North America All Platforms					
Software	75	94	85	98	90
Service	38	46	54	71	75
Europe All Platforms					
Software	113	95	95	99	86
Service	43	47	57	68	67
Asia All Platforms					
Software	78	104	124	129	151
Service	29	38	33	36	42
ROW All Platforms					
Software	2	2	1	1	2
Service	1	2	2	2	2

Source: Dataquest (October 1992)

Figure 4-3
PCB/MCM/Hybrid Software Consumption, by Region



Source: Dataquest (October 1992)

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almost exclusively in Japan. This company, only recently began an aggressive thrust into North America and Europe.

Other points of interest are as follows:

- Valid showed good gains in both revenue and market share in 1991, which is one of the primary reasons it was coveted by Cadence, whose success in penetrating the PCB market (through its garnering of PCB technology by acquiring ASI) had been limited.
- Scientific Calculations, acquired by Harris, has now changed its name to Harris EDA.

Dataquest Perspective

The PCB/MCM/hybrid market has reached a point of maturity. Any future growth in this area will be fueled by new applications, including MCM and other advanced packaging technologies. However, PCB layout providers must continue to stand guard and develop evolutionary products to keep pace with the myriad of other suppliers, both large and small, all seeking to leverage their special niche technologies into increasing market share.

Table 4-2
PCB/MCM/Hybrid Software Market Share, 1988 and 1989

Year Rank	Company	Software Revenue (\$M)	1988 Market Share (%)	Company	Software Revenue (\$M)	1989 Market Share (%)
1	Racal-Redac	48.2	16.3	Racal-Redac	51	15.9
2	Mentor Graphics	25.4	8.6	Mentor Graphics	42.3	13.2
3	Daisy Systems	23.2	7.8	Zuken	28.6	8.9
4	Zuken	19	6.4	Valid	20.2	6.3
5	CADAM	15.2	5.1	Dazix	15.8	4.9
6	Scientific Calculations	13.8	4.6	Computervision	14.3	4.4
7	Calay	13.5	4.5	Calay	14.2	4.4
8	Prime Computer	11.2	3.8	Scientific Calculations	12.8	4
9	Autodesk	10.5	3.6	Intergraph	10.1	3.1
10	IBM	10.2	3.4	Hewlett-Packard	8.6	2.7

Source: Dataquest (October 1992)

Table 4-3
PCB/MCM/Hybrid Software Market Share, 1990 and 1991

Year Rank	Company	Software Revenue (\$M)	1990 Market Share (%)	Company	Software Revenue (\$M)	1991 Market Share (%)
1	Racal-Redac	43.8	13.4	Zuken	50.3	15.3
2	Mentor Graphics	40.1	12.3	Racal-Redac	42.1	12.8
3	Zuken	36.2	11.1	Mentor Graphics	39.5	12
4	Valid	28.5	8.7	Valid	35.3	10.8
5	Scientific Calculations	15.6	4.8	Intergraph	17.3	5.3
6	Dazix	13.9	4.3	Sharp System Products	15	4.6
7	Sharp Systems Products	13.3	4.1	Harris EDA	13.9	4.2
8	Calay	12.1	3.7	IBM	11.5	3.5
9	Computervision	10.5	3.2	CADIX	11.3	3.4
10	IBM	10.3	3.2	CADAM	8.5	2.6

Source: Dataquest (October 1992)

Chapter 5

IC Layout Market

1991: The Year in Review

Introduction

The IC layout software market showed a 6.2 percent growth between 1990 and 1991. This growth is down almost half from the 1990 growth figure of 11.7 percent, yet outperforms the EDA industry growth of 3.8 percent. This growth is spurred by the increasing use of ASIC design methodologies for chip-level design, an idea pioneered by the early chip-set vendors.

Market Segmentation

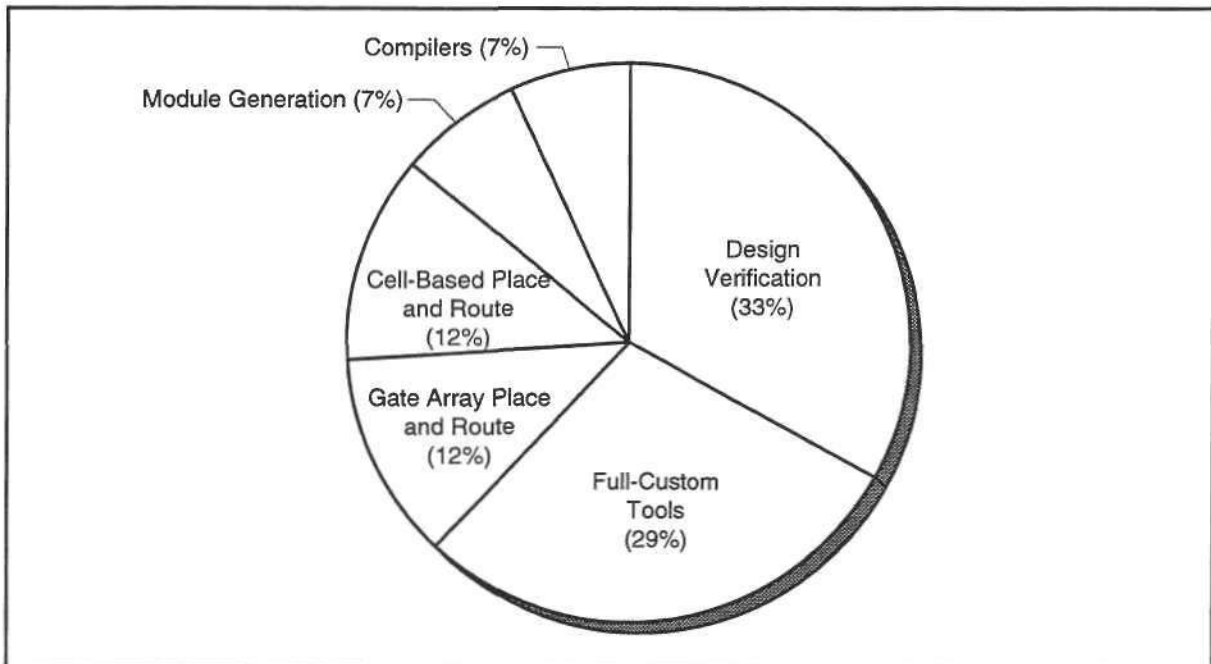
Dataquest segments the IC layout application market as follows:

- **Full Custom IC Design Tools**—Full custom tools include polygon editors, symbolic editors, compaction tools, and floor-planning systems.
- **Automatic Placement and Routing**—Automatic placement and routing (APR) consists of two different sets of tools, those for gate array design and those for cell-based IC design.
- **Design Verification**—Design Verification tools include design rule checking, electrical rules checking, layout-versus-schematic checkers, and parasitic extraction.
- **Compilers**—Compilers are predominantly cell compilers and associated tools for the automatic creation of library cells based upon low-level silicon design rule information.
- **Module Generators**—Module generators are software packages that use parameterized inputs to create high-level library cells (such as datapath, RAM, and ROM) based upon lower-level ASIC vendor supplied cells.

Full Custom IC Design Tools

Showing sales of \$55 million, the full custom tool arena has remained stagnant for the past three years (see Figures 5-1 and 5-2). Almost all full custom tools are supplied to the semiconductor industry. The recession, which has negatively impacted semiconductor production, and hence IC layout capital spending, has caused the stagnation of this market.

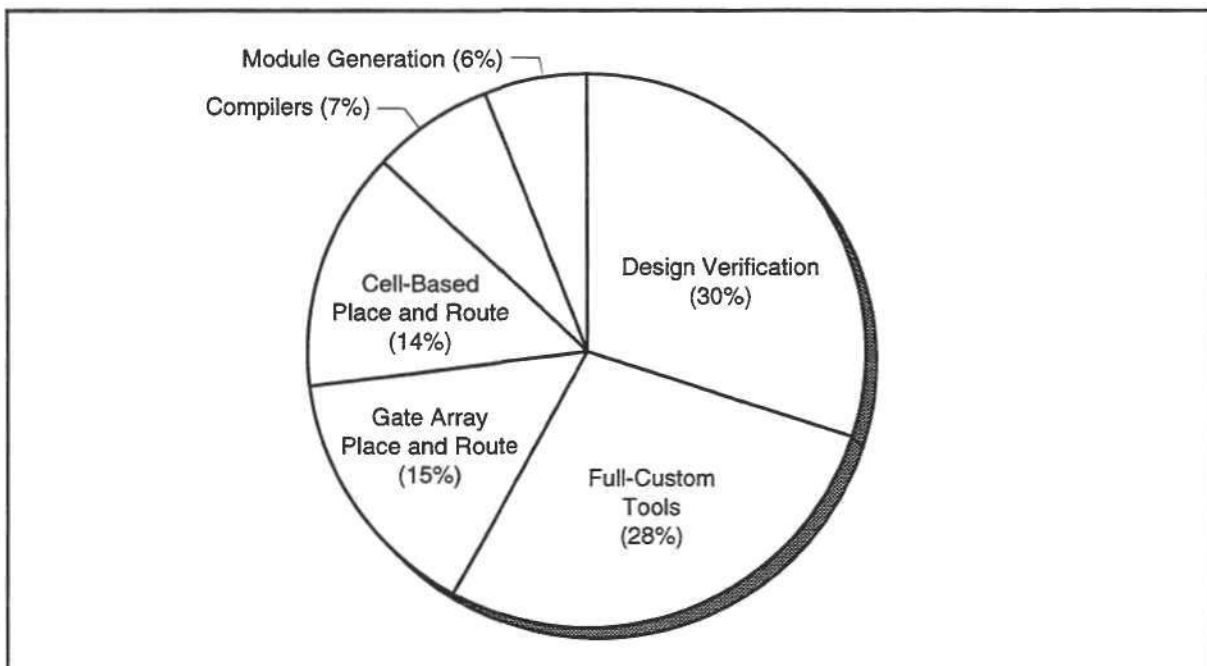
Figure 5-1
Worldwide IC Layout Software Market Segmentation for 1990



Source: Dataquest (October 1992)

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Figure 5-2
Worldwide IC Layout Software Market Segmentation for 1991



Source: Dataquest (October 1992)

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During the past three years, the increasing time-to-market pressure has caused semiconductor companies to re-evaluate their design process. The success of chip-set companies has been based on applying an ASIC design methodology to custom devices. Therefore it is not surprising that fueling the IC layout growth has been ASIC methodology design tools, primarily automatic placement and routing.

Automatic Placement and Routing

Automatic placement and routing tools fueled IC layout growth in 1991, posting growth rates of 32 percent and 23 percent for gate-array and cell-based technologies, respectively. This trend is driven by chip-set and more traditional semiconductor houses adopting ASIC design techniques.

Gate-array and cell-based placement and routing tools continue to gain ground on more traditional IC layout tools. APR now accounts for 29 percent of the IC layout market, and Dataquest anticipates that this trend will continue for the next three to five years.

Design Verification

Contributing \$59 million to the IC layout market, design verification was essentially flat between 1990 and 1991. This is primarily due to the one-sided nature of this application. Cadence continues to dominate this area with its Dracula product. While Mentor Graphics has been aggressively marketing its Checkmate product, it has been slow to garner a large segment of the market. Cadence will continue to service its existing customers, but as a market, design verification will continue to remain flat until new technology is brought to bear on the problem.

Module Generators and Compilers

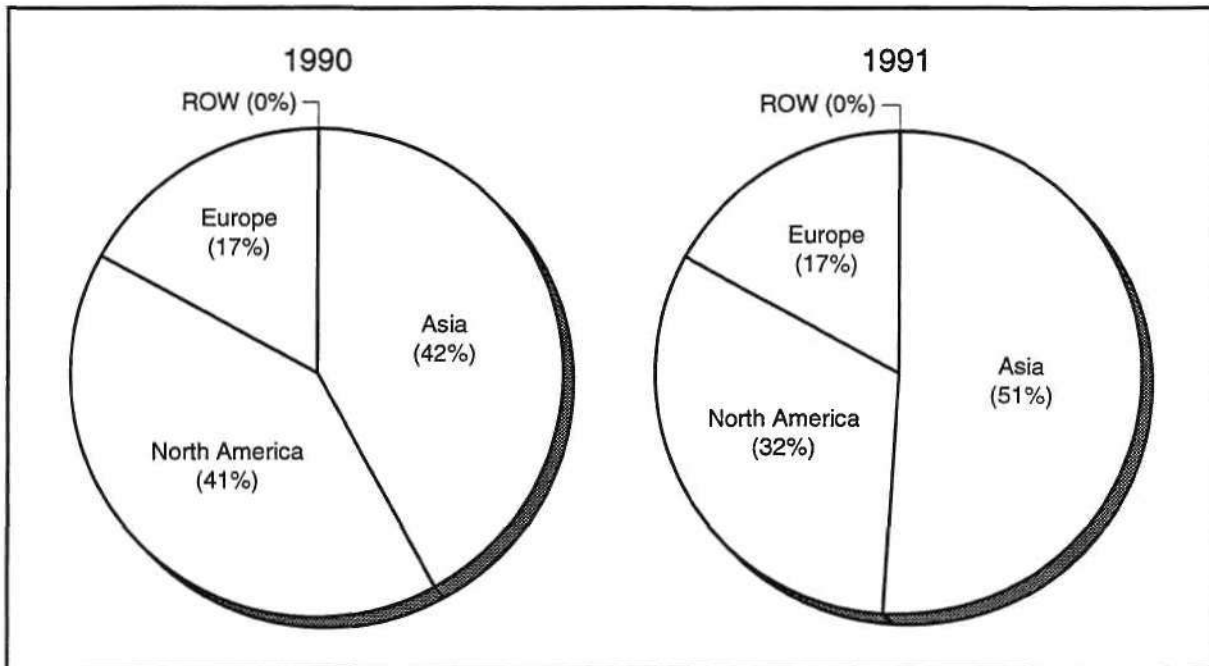
Module generators continue a disappointing performance, showing no growth between 1990 and 1991 posting only \$12 million in 1991, versus \$13 million in 1990. It has been an uphill battle for EDA companies to establish a need within the designer's mind for this type of product. Cadence, which enjoys IC layout dominance, has been surprisingly ineffective in providing a successful product in this arena, which continues to be Mentor Graphics' strength with its GDT product.

Cell compilers languish with its module generation brethren, posting an essentially flat 1991 at \$14 million. Dataquest anticipated that this market would continue to remain flat for the foreseeable future in 1991. Third-party suppliers of cell compilers find it difficult to work with ASIC companies that have typically bundled their proprietary cell compilers with their libraries.

Shipments

The year 1991 saw Asia becoming the largest consumer of IC layout tools by a wide margin (see Figure 5-3 and Table 5-1). This should come as no surprise to those working in the semiconductor

Figure 5-3
IC Layout Software Consumption, by Region



Source: Dataquest (October 1992)

G2001693

Table 5-1
IC Layout Software and Service Consumption, by Region

	1987	1988	1989	1990	1991
Worldwide All Platforms					
Software	166	159	169	184	196
Service	34	63	73	94	115
North America All Platforms					
Software	91	65	71	75	63
Service	16	28	37	48	57
Europe All Platforms					
Software	37	31	30	31	34
Service	8	18	18	26	33
Asia All Platforms					
Software	38	62	67	78	99
Service	9	17	18	19	24
ROW All Platforms					
Software	0	0	0	0	0
Service	0	1	1	1	1

Source: Dataquest (October 1992)

business. The past five years have seen a shift in the production of semiconductors—once a U.S.-based industry—toward Asia. Asian semiconductor vendors are now shifting their reliance from internal IC tools to commercially supplied tools. Dataquest anticipates that this trend will continue for the next three to five years as more IC design is centered in Asia.

Market Share

The past four years has seen Cadence's market share skyrocket from 27.6 percent in 1988 to 56.9 percent in 1991 (see Tables 5-2 and 5-3). Mentor Graphics, with its acquisition of Silicon Compiler Systems in 1989, became the second leading supplier, but still trails Cadence by \$77.6 million. However, IC layout may be considered a duopoly at this point, with Cadence and Mentor Graphics to capture 74 percent of the worldwide IC layout market (see Figure 5-4).

Dataquest Perspective

IC layout software showed strong gains in comparison to the overall EDA market in 1991. This growth stemmed from the stability of the dominant vendors and the continuing need of semiconductor vendors to shrink die sizes in order to improve gross margins. Those who believe that "silicon is free" have not talked to chip-level designers, whose efficacy is based upon his or her ability to deliver the most performance and functionality on the smallest die size possible. This is exemplified by the perception of electronic designer. Shown in Figure 5-5 are North American designers' perceptions of the most important factors to product success. Notice that increasing functionality and reducing cost are ranked No. 2 and No. 3, behind "reducing time to market."

Table 5-2
IC Layout Software Market Share, 1988 and 1989

Year Rank	Company	Software Revenue (\$M)	1988 Market Share (%)	Company	Software Revenue (\$M)	1989 Market Share (%)
1	Cadence	43	27.6	Cadence	76.2	47.3
2	Silicon Compiler Systems	19.2	12.1	Silicon Compiler Systems	23	14.3
3	Seiko	15.3	9.7	Mentor Graphics	16.6	10.3
4	Mentor Graphics	12.5	7.9	Valid	10.8	6.7
5	Silvar-Lisco	8.8	5.5	Seiko Instruments	7.8	4.8
6	Autodesk	7	4.4	VLSI Technology	6.7	4.2
7	Valid	3.6	2.2	European Silicon Systems	5.5	3.4
8	Daisy Systems	2.3	1.5	Silvar-Lisco	4.9	3
9	VLSI Technology	2.2	1.4	Seattle Silicon	3.5	2.2
10	LSI Logic	1.6	1	Integrated Silicon Systems	1.9	1.2

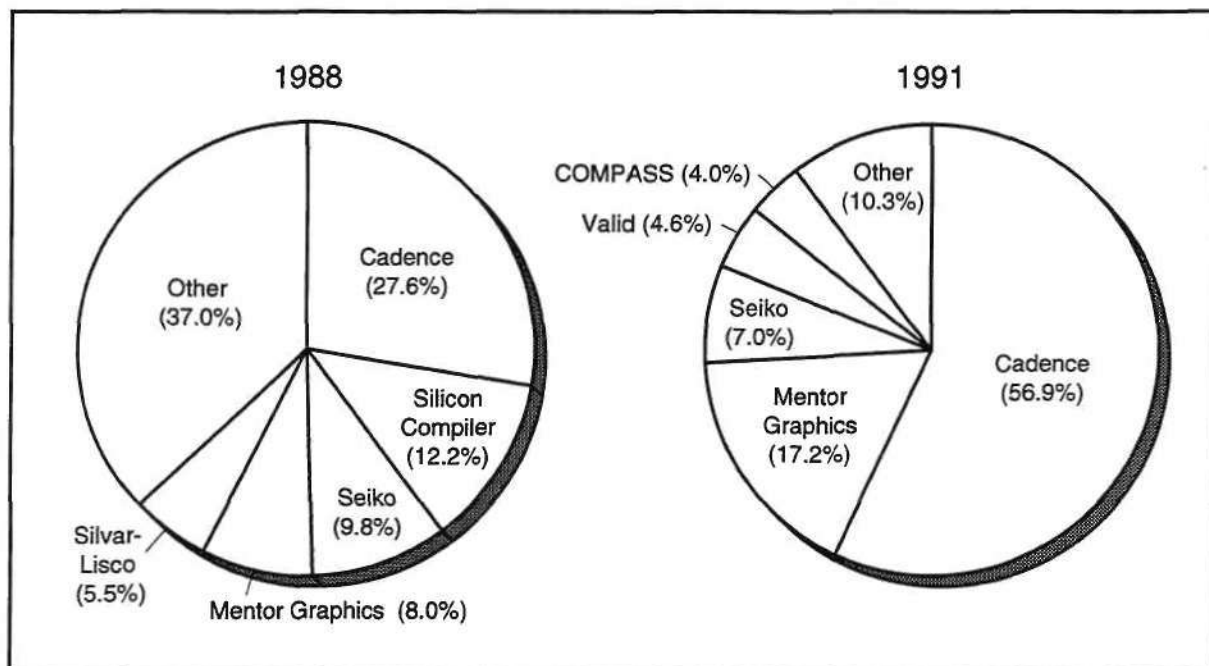
Source: Dataquest (October 1992)

Table 5-3
IC Layout Software Market Share, 1990 and 1991

Year Rank	Company	Software Revenue (\$M)	1990 Market Share (%)	Company	Software Revenue (\$M)	1991 Market Share (%)
1	Cadence	101.7	55.7	Cadence	111.3	56.9
2	Mentor Graphics	31.9	17.5	Mentor graphics	33.7	17.2
3	Seiko Instruments	16.2	8.9	Seiko Instruments	13.7	7
4	Valid	9.9	5.4	Valid	9	4.6
5	Silvar-Lisco	7	3.8	COMPASS Design Automation-VLSI	7.9	4
6	VLSI Technology	6.1	3.3	Silvar-Lisco	5.2	2.7
7	Seattle Silicon	3	1.7	Sagantec	3.6	1.8
8	Integrated Silicon systems	1.9	1	Cascade Design Automation	3	1.6
9	NEC	1.2	0.7	Integrated Silicon Systems	2.5	1.3
10	LSI Logic	1.2	0.7	NEC	1.3	0.6

Source: Dataquest (October 1992)

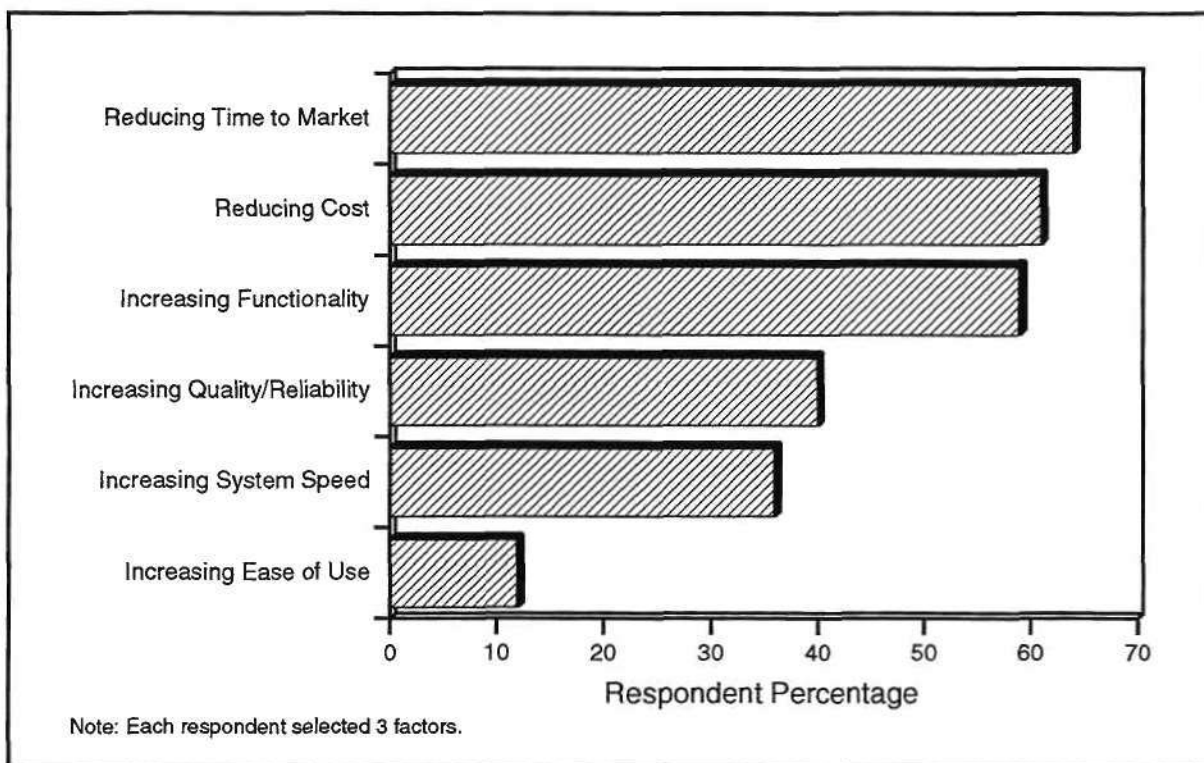
Figure 5-4
Worldwide IC Layout Market Share, by Top Five Vendors



Source: Dataquest (October 1992)

G2001694

Figure 5-5
North American Electronic Design Factors for Product Success



Source: Dataquest (October 1992)

G2001695

Appendix A

Table A-1
EDA Revenue Worldwide, by Platform

	1987	1988	1989	1990	1991
Software Revenue (\$)	828	916	1,073	1,167	1,210
Technical Workstation	551	657	821	891	936
Host Dependent	113	102	81	80	40
Server	NA	NA	NA	NA	23
Personal Computer	165	153	171	195	211
Service Revenue (\$)	285	388	457	566	616
Technical Workstation	177	252	318	428	458
Host Dependent	86	112	108	104	71
Server	NA	NA	NA	NA	47
Personal Computer	22	24	30	33	40

NA = Not available

Source: Dataquest (October 1992)

Table A-2
EDA Revenue North America, by Platform

	1987	1988	1989	1990	1991
Software Revenue (\$)	342	391	450	504	489
Technical Workstation	219	275	335	386	379
Host Dependent	47	37	37	33	14
Server	NA	NA	NA	NA	10
Personal Computer	77	79	77	86	86
Service Revenue (\$)	125	171	209	260	288
Technical Workstation	76	110	147	199	217
Host Dependent	41	49	51	49	32
Server	NA	NA	NA	NA	24
Personal Computer	9	12	11	12	14

NA = Not available

Source: Dataquest (October 1992)

Table A-3
EDA Revenue Europe, by Platform

	1987	1988	1989	1990	1991
Software Revenue (\$)	278	257	283	309	306
Technical Workstation	191	188	212	232	226
Host Dependent	30	20	15	16	9
Server	NA	NA	NA	NA	3
Personal Computer	56	49	56	61	68
Service Revenue (\$)	91	125	156	192	199
Technical Workstation	57	79	110	146	145
Host Dependent	24	37	36	36	26
Server	NA	NA	NA	NA	15
Personal Computer	10	9	10	10	13

NA = Not available

Source: Dataquest (October 1992)

Table A-4
EDA Revenue Asia, by Platform

	1987	1988	1989	1990	1991
Software Revenue (\$)	203	258	335	345	407
Technical Workstation	139	191	271	271	328
Host Dependent	35	44	29	30	17
Server	NA	NA	NA	NA	9
Personal Computer	29	23	35	44	53
Service Revenue (\$)	66	88	87	108	124
Technical Workstation	42	62	60	82	94
Host Dependent	20	23	18	16	12
Server	NA	NA	NA	NA	6
Personal Computer	4	4	9	11	13

NA = Not available

Source: Dataquest (October 1992)

Table A-5
EDA Revenue Rest of World, by Platform

	1987	1988	1989	1990	1991
Software Revenue (\$)	5	6	5	7	8
Technical Workstation	2	3	1	2	3
Host Dependent	1	1	1	1	0
Server	NA	NA	NA	NA	0
Personal Computer	2	2	3	4	5
Service Revenue (\$)	3	4	3	3	5
Technical Workstation	1	2	1	1	2
Host Dependent	2	2	2	2	2
Server	NA	NA	NA	NA	1
Personal Computer	0	0	0	0	0

NA = Not available

Source: Dataquest (October 1992)

Dataquest®

DB a company of
The Dun & Bradstreet Corporation

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
United States
Phone: 01-408-437-8000
Facsimile: 01-408-437-0292

Dataquest Incorporated
Dataquest/Ledgeway
The Corporate Center
550 Cochituate Road
Framingham, Massachusetts 01701-9324
United States
Phone: 01-508-370-5555
Facsimile: 01-508-370-6262

Dataquest Europe Limited
Roussel House Broadwater Park
Denham, Near Uxbridge
Middlesex UB9 5HP
England
Phone: 44-895-835050
Facsimile: 44-895-835260/1

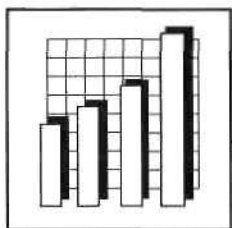
Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa Chuo-ku
Tokyo 104
Japan
Phone: 81-3-5566-0411
Facsimile: 81-3-5566-0425

Offices in
Costa Mesa, Munich,
Paris, and Seoul

Representative Agencies in
Bangkok, Hong Kong,
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Electronic Design Automation Applications



Market Trends

Market Outlook

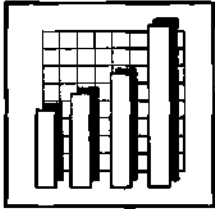
CAD/CAM/CAE

Electronic Design Automation Applications

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December 28, 1992

Electronic Design Automation Applications



MarketTrends

Market Outlook

Published by Dataquest Incorporated

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Chapter 1

Report Overview

Report Organization

This report is Part II of a two-part series on the Electronic Design Automation (EDA) Applications Market. Part I, entitled *Market in Review*, has already been published.

This report, *Market Outlook*, represents the results of Dataquest's analysis and forecast of the EDA applications market. It provides insight into the future market sizes of Electronic CAE, PCB/MCM, and IC Layout software markets. The contents of this book is summarized below:

- **Executive Summary**—Presents the overall EDA market in terms of future performance, as well as global trends and potential future restructuring of the EDA market.
- **Subapplication market chapters**—Each subapplication chapter provides analysis into the future market potentials, including the following:
 - **Introduction and Forecast**—Provides global information regarding Dataquest's forecast of software revenue during the next five years for each application area.
 - **Driving Forces**—A detailed analysis of market factors that will drive or hinder future growth. Takes into account such factors as design methodology shifts, new tool introductions, and saturation levels within the market.
 - **Regional Effects**—Analyzes the historical and future consumption of software tools. The major geographic areas include North America, Asia, Europe, and Rest of World (ROW).
 - **Dataquest Perspective**—Provides a summary of general trends in each market and specific areas to watch for future opportunities.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is an underlying philosophy that says the best data and analysis come from a well-balanced program: balance between primary and secondary collection techniques; between supply-side and demand-side analysis; focused industry specific research and coordinated, "big-picture" analysis aided by integration of data from more than 25 separate

high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macroenvironment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at GNP growth, interest rate fluctuation, currency fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1992. Figure 1-1 depicts the building blocks for the EDA forecast.

Data Collection Process

End-User Data

Dataquest demand-side (also called end-user) data are gathered using an extensive survey technique. End users are identified through the registered user and prospect lists of EDA and ASIC companies. Surveys were distributed throughout North America, Europe, and Japan, enabling Dataquest to gather a snapshot of electronic design methodology and usage trends. Relying upon Dataquest's international expertise, surveys distributed in Japan were translated into kanji, the Japanese character set, in order to improve the surveys' accuracy.

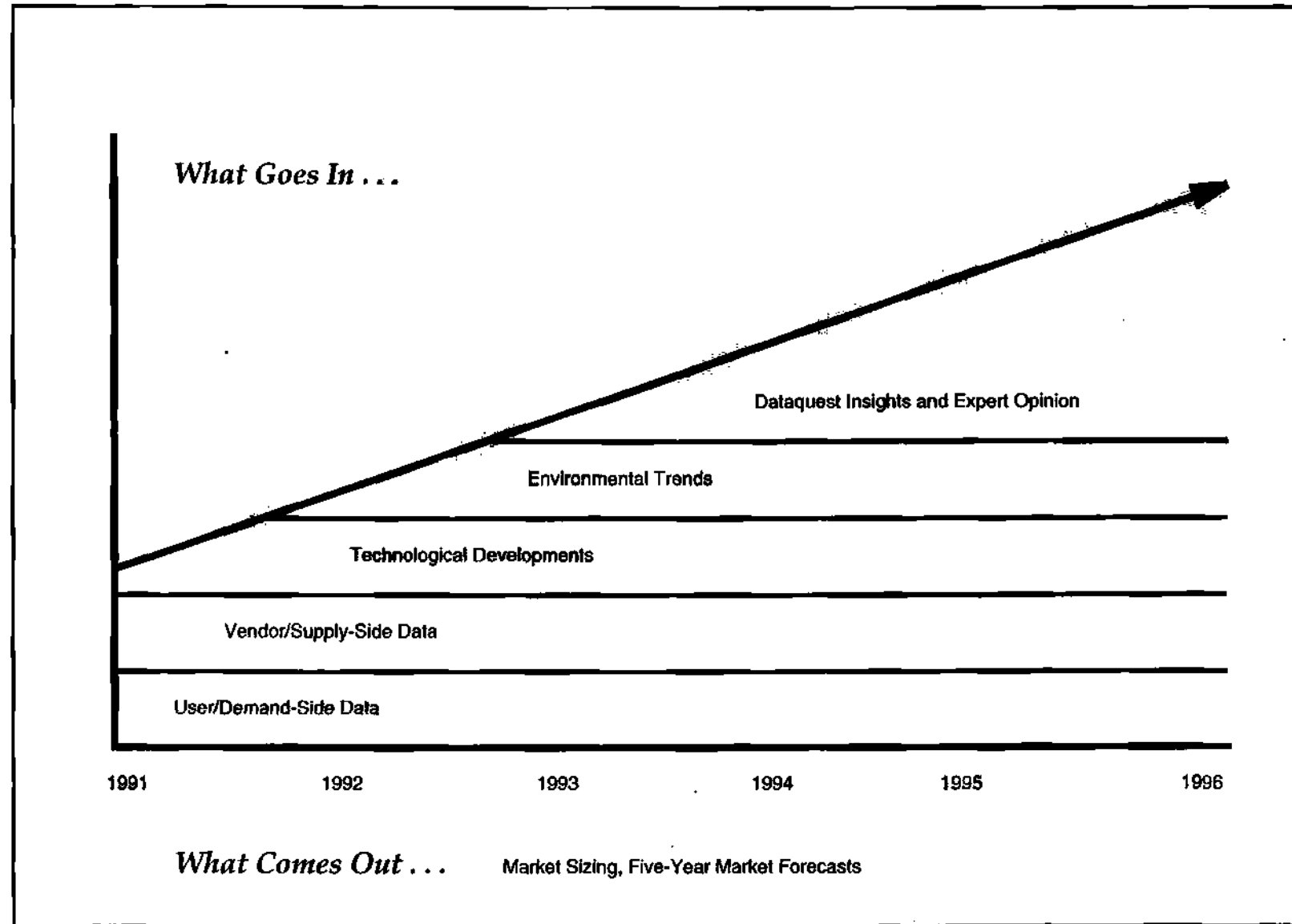
Surveys were mailed in the second half of 1991 to North American sites. The responses were then examined for integrity and entered into a database to allow manipulation and cross-cutting of the data. Japanese surveys were distributed at the end of 1991, and the responses were similarly processed and entered in early 1992. Finally, European surveys were complete in the spring of this year. (Complete demographic information and a copy of the survey used is available in the *EDA Applications: User Wants and Needs Report*.)

Supply-Side Data

In the fourth quarter of each year, Dataquest surveys all major participants in the EDA industry to obtain preliminary market share data. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contact at large companies. Examples of the job titles of people contacted for information are as follows:

- President and CEO
- Vice president and general manager
- Vice president of marketing
- Vice president, strategic product planning
- Director of strategic planning

Figure 1-1
Dataquest's Building Blocks for EDA Market Forecasting



Source: Dataquest (December 1992)

G2001957

- Director of marketing
- Director of market development
- Manager, CAD/CAM/CAE marketing programs
- Market research analyst

We resurvey select companies during the second quarter of the following year to verify final annual results and determine the CAE Granularity. The information in this document is based upon these final market share data.

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice and checks with multiple sources at one company to cross-check data on that company.

We believe that the estimates presented here are the most accurate and meaningful generally available today. Dataquest's EDA market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

Chapter 2

Executive Summary

EDA Software Market Trends

The EDA market posted a lackluster 4 percent software growth in 1991, and Dataquest anticipates that 1992 will show only a 3 percent increase over 1991 figures. This slowdown of what had been historically high growth rates may be attributed to the following factors:

- Product transitions and mergers of the top EDA suppliers have caused stagnation in the purchasing of new EDA tools. Our research shows that consumers of EDA tools are prolonging their evaluation process and examining new ways to shorten their design cycles.
- Global recession and political and economic infrastructure changes in North America and Europe have temporarily paralyzed capital equipment expenditure on a broad scale. Additionally, the Japanese economic downturn has caused revenue to fall for vendors that supply products that are not mission critical.
- Saturation levels are being reached for certain EDA tools. In particular, our research shows that there is only a small need for additional tools such as gate-level simulation, schematic capture, and PCB layout. Any future growth in these markets will be brought by applying new technologies to these problems and replace the existing seats.
- The final vestiges of platform dependence are being removed from the EDA industry. This has had a short-term negative effect on the market, but should improve the profitability of EDA tool suppliers in the future.

In the future, Dataquest anticipates that EDA software revenue will become more closely associated with economic conditions in its target markets. No longer are vast numbers of seats being discovered, but instead the total number of seats will expand or contract based upon the growth or decline of companies producing electronic products.

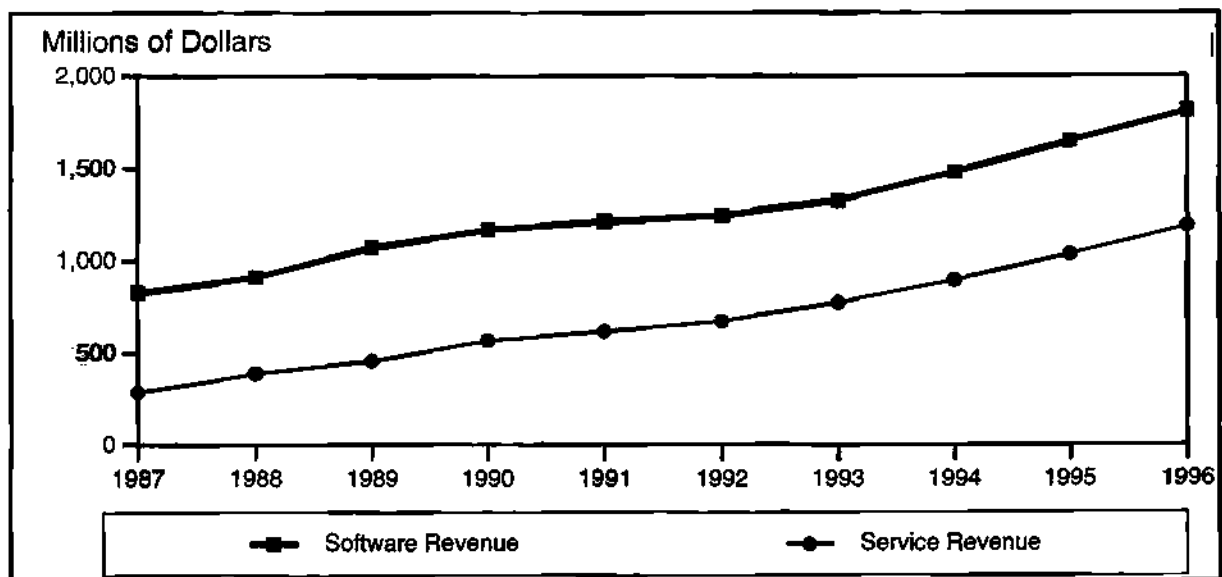
Yet there are still large opportunities for EDA suppliers who are able to provide tools that improve the productivity and reduce the cost of designing electronic systems. The ever-increasing demands to shorten the design cycles and increase the functionality of electronic products will fuel the purchasing of new EDA tools. Dataquest believes that significant opportunity exists in the following areas:

- Advanced analysis tools for IC and PCB designs. Increasing clock frequencies will require tighter design tolerances and sophisticated analysis tools will be needed to ensure proper operation.

- Architectural-level tools to improve designer productivity. While top-down design is now being adopted by the majority of electronic designers, architectural-level tools will gain prominence in the next two to five years, signaling yet another shift in the methodology of designing electronic systems.
- Dataquest anticipates that a higher service content will emerge in the EDA industry as large suppliers shift their business models toward providing integration and consulting services, as well as a focus toward solutions selling. This will cause service revenue to grow commiserate with software sales, as shown in Figure 2-1.

The combination of these factors, both positive and negative, combine to form a rather muddled outlook for EDA software for the next five years. Companies that correctly position themselves in providing technologically superior products will show good gains in replacing older technologies. Those suppliers that are able to fundamentally shift the way electronic systems are designed will show large gains, while those companies that fail to anticipate methodology shifts will falter. All of this activity will take place in a market that will show minimal gains during the next five years. Our current forecast shows the worldwide EDA software market will have an 8 percent compounded annual growth rate (CAGR). This is down from the 10 percent CAGR the industry experienced in the 1987 to 1991 time frame. Growth in the Asian market is shown in Figure 2-2. The majority of this growth will be seen in the technical workstation market, as the last vestiges of host-based software are retired, as shown in Figures 2-3 and 2-4.

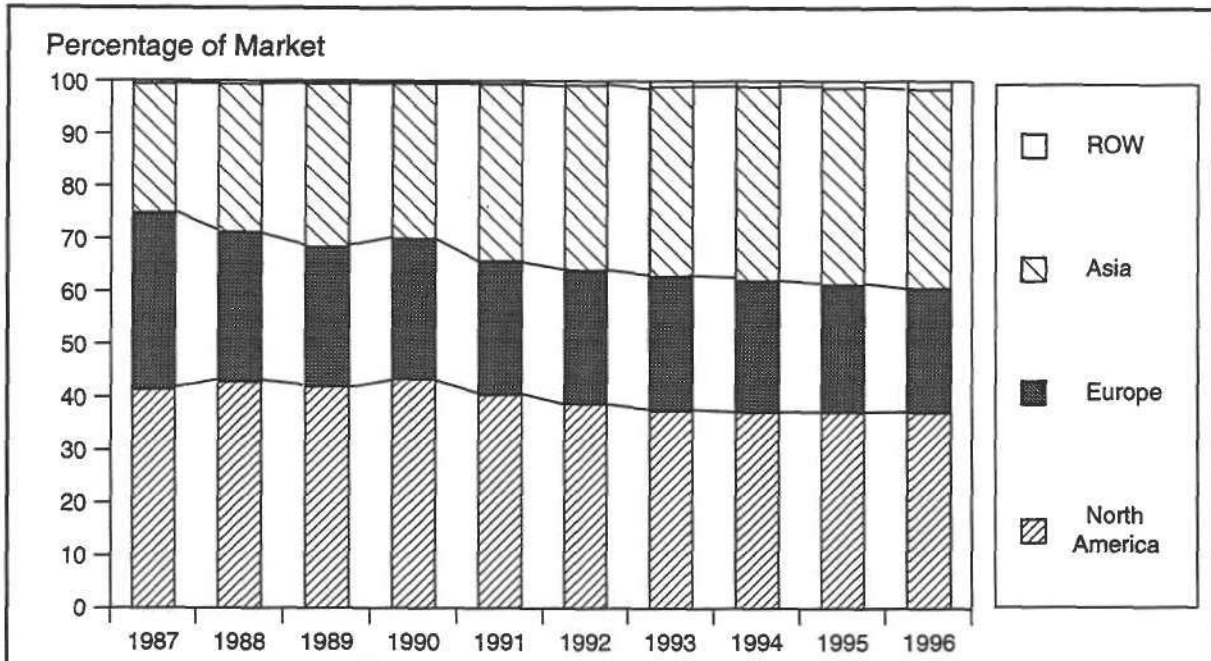
Figure 2-1
Worldwide EDA Software and Service Market History and Forecast



Source: Dataquest (December 1992)

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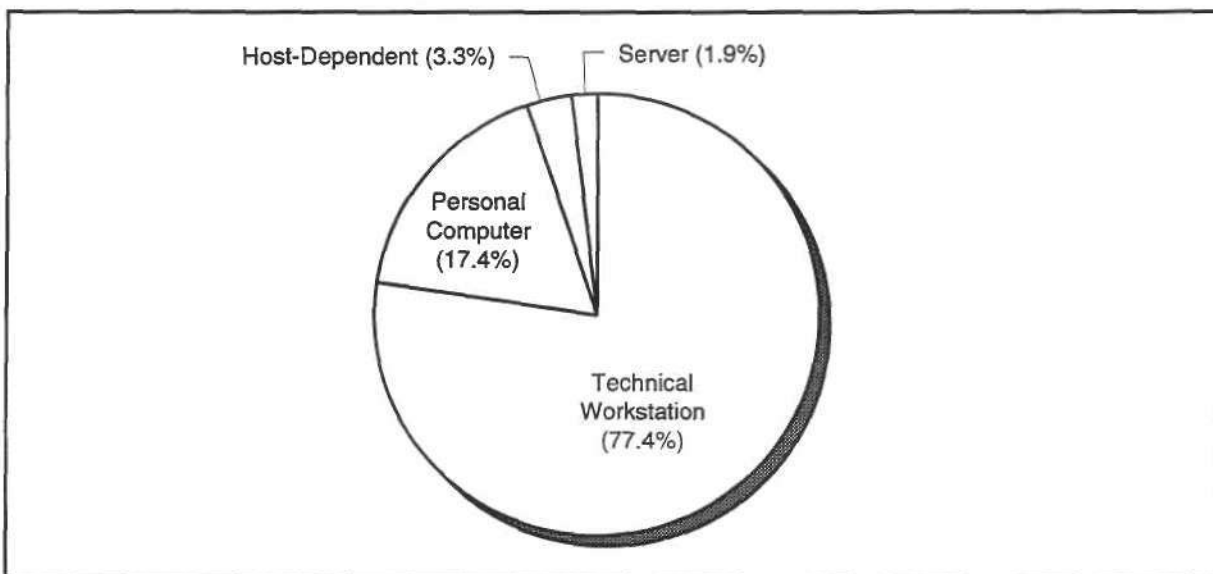
Figure 2-2
EDA Software Regional Consumption History and Forecast



Source: Dataquest (December 1992)

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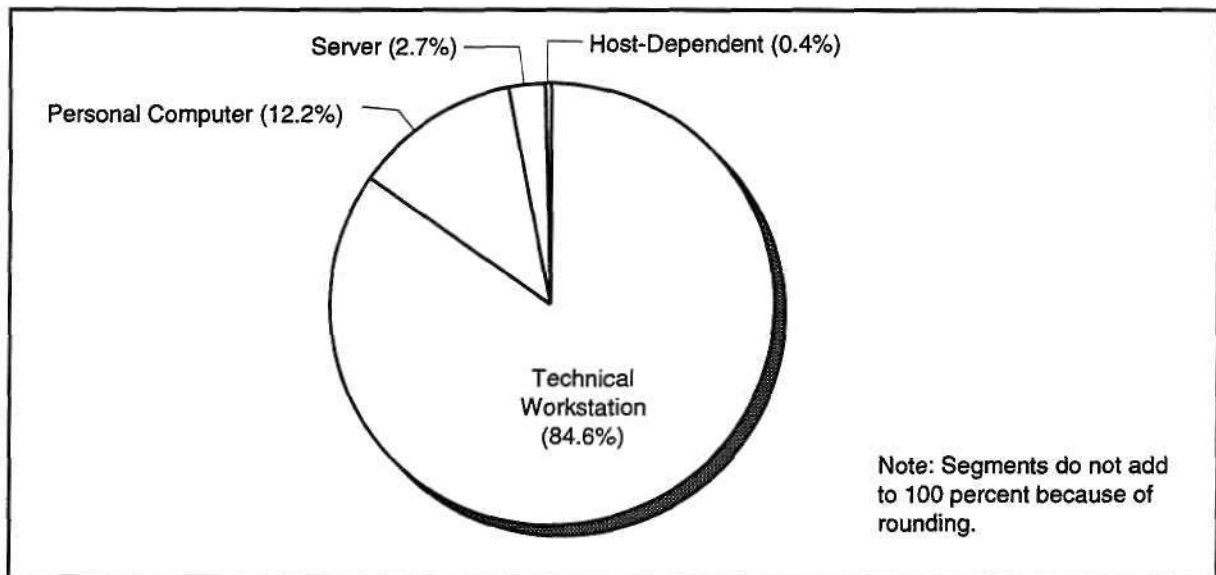
Figure 2-3
1991 EDA Software Revenue by Platform



Source: Dataquest (December 1992)

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Figure 2-4
Forecast 1996 EDA Software Revenue by Platform



Source: Dataquest (December 1992)

G2001961

Dataquest Perspective

As the EDA industry matures, it will begin to exhibit the characteristics of other mature markets. This will manifest itself in growth rates complementary to its end markets as opposed to explosive market expansion. Regional effects will play an important role, as design and manufacturing expertise migrates, and previously unknown markets in the Far East and Eastern Bloc will present themselves. The impact of framework technology and new operating systems have yet to manifest themselves on a broad scale, yet hold the potential to disturb the market. In particular, Window NT has the possibility to depress average selling prices if it gains inroads into the technical community, and industry-standard frameworks could affect larger EDA vendors' business models, but Dataquest anticipates that the full impact will not be felt for some years to come.

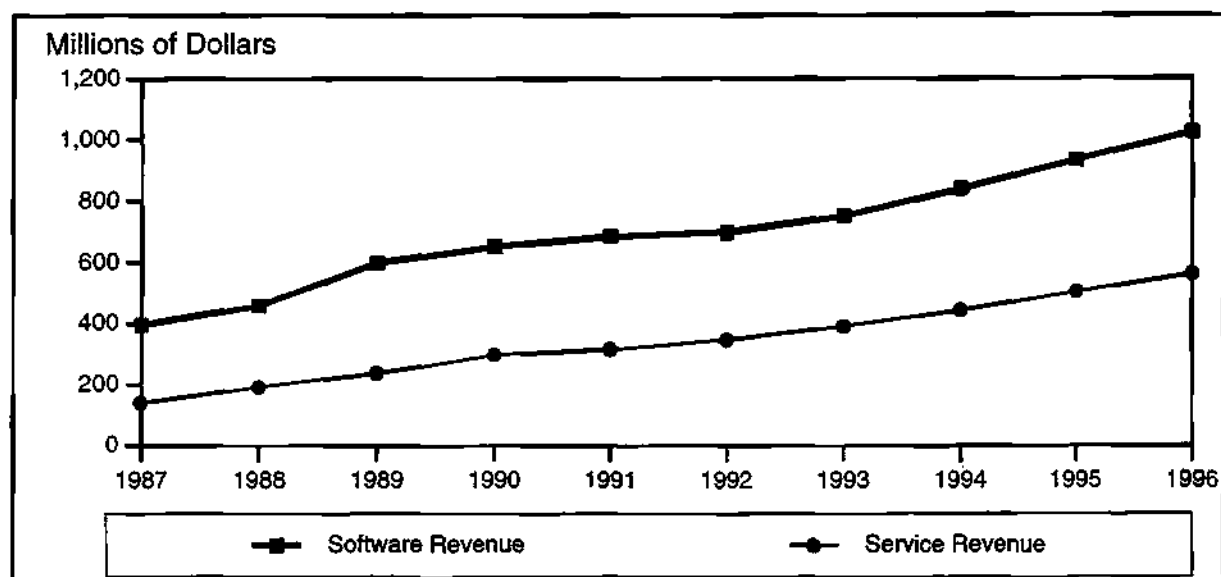
Chapter 3

CAE Market

Introduction and Forecast

Dataquest classifies CAE software as those tools that are used in the engineering or design phase of electronic products, as opposed to the physical layout phase of product development. CAE performed poorly in 1991, with only a 4.9 percent growth. This is a far cry from the hey-day of CAE—the mid-1980s, which saw growth rates anywhere from 20 to 40 percent. However, one must delve deeper into the CAE market anatomy to clearly understand the driving forces behind the overall numbers. While the overall usage of CAE software may be slowing, the underlying dynamics of how electronic systems are being designed are experiencing rapid changes. Designers are currently in the midst of a change in design methodology, namely the increasing usage of top-down design for ASIC development. As Dataquest looks forward, we see new opportunities to extend this methodology philosophy to the architectural or system level (see Figure 3-1).

Figure 3-1
Worldwide CAE Software and Service Market History and Forecast



Source: Dataquest (December 1992)

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Driving Forces

The lackluster performance of the CAE market may be attributed to the following:

- Product transitions
- Saturation of the electronic design market
- Acceptance of top-down design by mainstream designers
- Advanced analysis tools
- Test automation

Product Transitions

The largest provider of CAE tools, Mentor Graphics, continues to experience difficulties in migrating its users toward its 8.X offering. This problem, combined with the lack of enhancements and follow-on product for the 7.0-based tools, has had a detrimental effect on the overall CAE industry. Mentor, which held 11 percent of the CAE software market share in 1991, was not alone in its difficulties. Cadence also had limited CAE sales in 1991, due to the lukewarm response to its Composer front-end offering. Dataquest anticipates that the solidification of the vendor base, the adoption of Mentor Graphics 8.2 products, and the emergence of Viewlogic, Synopsys, and others will help to deliver renewed growth rates.

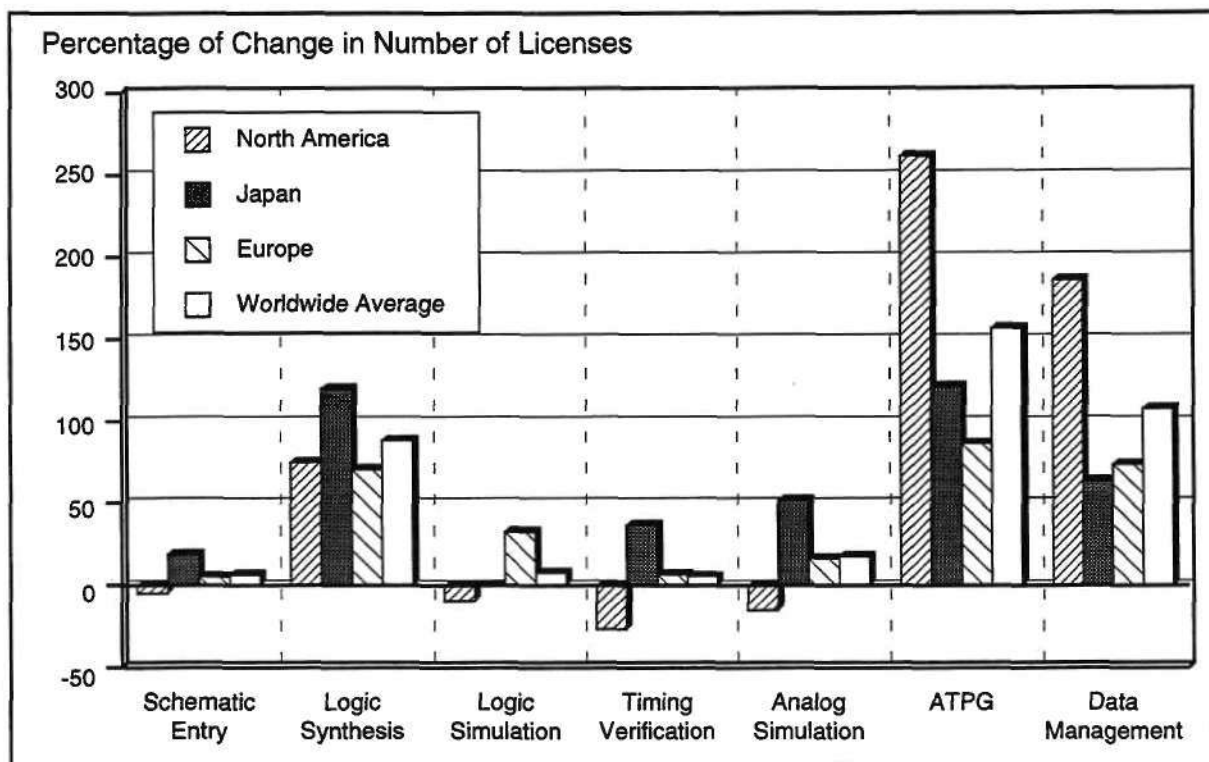
Saturation of the Electronic Design Market

Dataquest research shows that for the large majority of CAE tools, the market has reached a saturation point. Dataquest has done extensive end-user research into the saturation of the EDA market. Shown in Figure 3-2 are the results of our worldwide survey of electronic designers. We asked users how many licenses of selected CAE products they currently owned, and how many they needed. We then translated the mean numbers into percentage increases of CAE tools. As can be clearly seen, except for logic synthesis and automatic test pattern generation (ATPG) tools, most CAE application shows limited growth potential. What this denotes is the beginning of a replacement market, where we can expect growth rates to correlate more readily with the end-user market expansion, as opposed to the high growth rates based upon the discovery of new users. Dataquest does not anticipate additional dollars to be translated from internal tool consumption to external purchases either. Our worldwide research indicates that electronic design houses are now spending 15 percent of their EDA budgets on internally developed tools, and 85 percent on commercially available tools.

Acceptance of Top-Down Design by Mainstream Designers

Clearly, the near-term growth of the CAE market is based upon the acceptance of top-down design methodologies by the mainstream designer. In 1991, approximately half of the designers in North America and Japan were utilizing one of the two commercially

Figure 3-2
Percentage Difference in Number of Licenses Owned versus Number Needed,
CAE Applications



Source: Dataquest (December 1992)

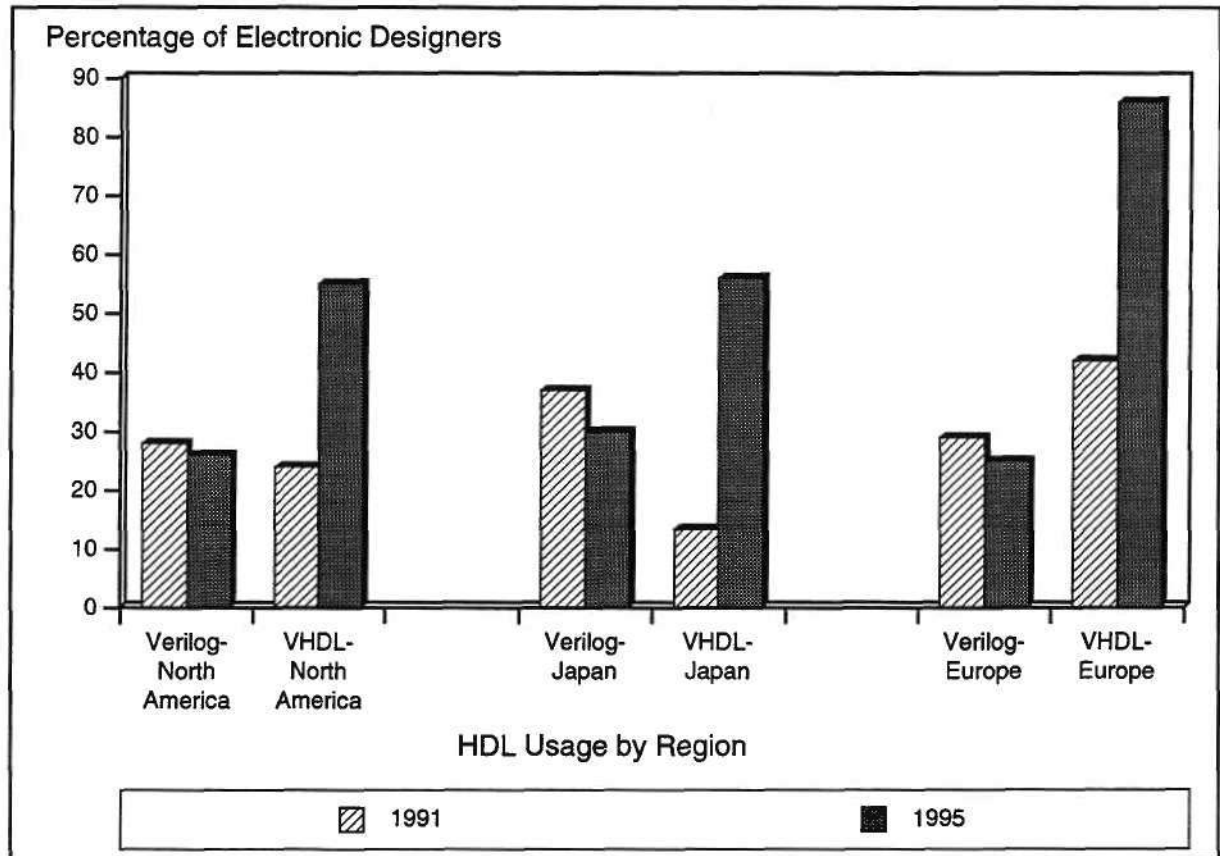
G2001963

available HDLs, Verilog or VHDL, as shown in Figure 3-3. This usage will increase to more than 75 percent of the designers worldwide by 1995. However, usage of a hardware description language alone is not indicative of the acceptance or penetration of top-down design methodology. Dataquest believes that top-down design is still in its infancy, and there continues to exist market opportunities for companies providing superior tools in logic synthesis, high-level design entry, and test automation tools.

Advanced Analysis Tools

Board-level speeds are reaching new heights. Primarily driven by the performance race fostered by high-end computer vendors, the need to extract and analyze what had been previously negligible effects such as inductive coupling, load matching, and power and thermal management are now being brought into the collective consciousness of the electronic designer. Microprocessor speeds continue their steady increase, and the new wave of 100-plus-MHz processors from Intel, DEC, HP, and others will require designers to evaluate a new breed of signal integrity tools. These tools will help ensure that designers will have working boards, and take into account crosstalk, transmission line effects, and power and thermal issues as well. This market of signal integrity tools is currently

Figure 3-3
Current and Projected Usage of Commercially Available HDLs



Source: Dataquest (December 1992)

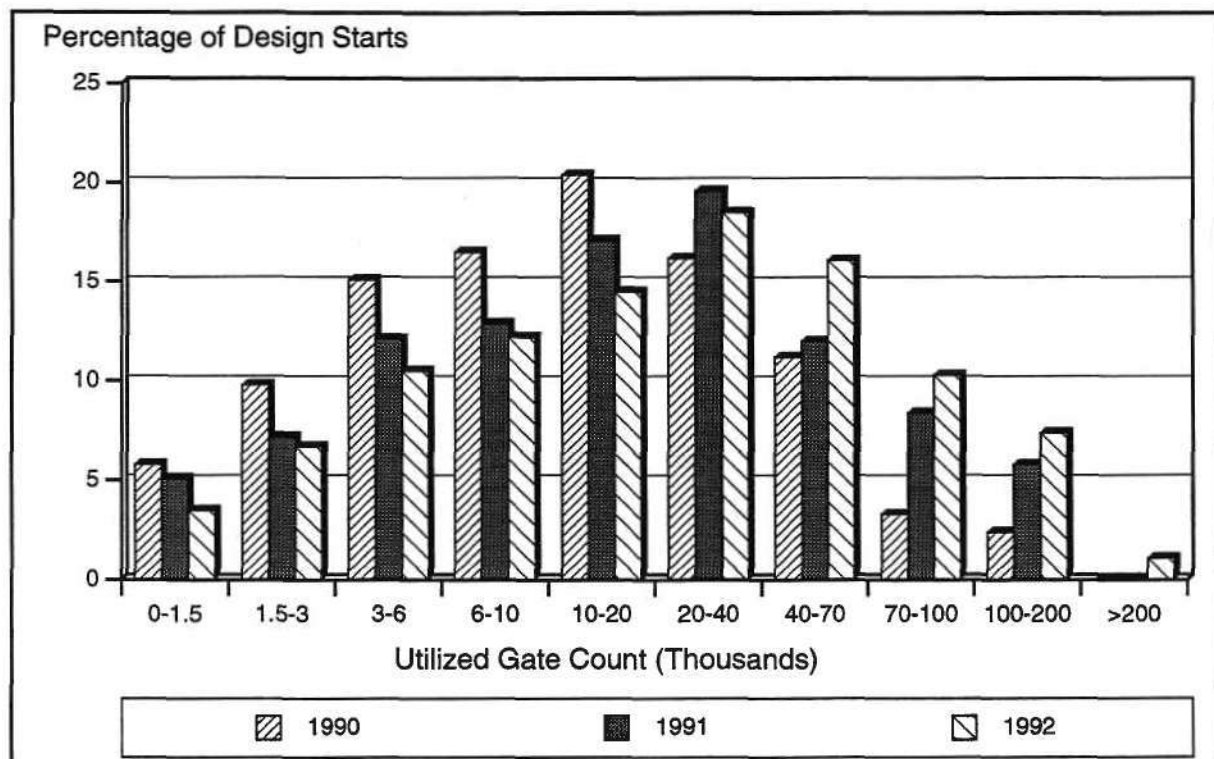
G2001964

small, but Dataquest anticipates substantial growth rates in the mid-1990s as they become an integral part of system design.

Test Automation

Test Automation, currently a \$30 to \$40 million dollar market, is about to show some significant growth. Two primary factors have been met in order to see a renewed interest, from both the demand side and the supply side. From the vendor base, we have seen a plethora of new product introduced from such companies as Sunrise Test, Expertest, Synopsys, as well as such broad-based suppliers such as Viewlogic, Cadence, and Mentor Graphics. These new products have given designers a wide range of choices to implement their test logic. Meanwhile, ASIC gate densities have just recently reached a level at which ad hoc test methodologies fail. As shown in Figure 3-4, it was only recently that we saw the plurality of North American MOS gate array design start to reach the 20,000 to 40,000 gate mark. 1992 will see 34 percent of North American gate array design start at more than 40,000 gates, a range that absolutely requires a rigorous test approach. In fact, automatic test-pattern generation tools show the highest pent-up demand,

Figure 3-4
MOS Gate Array Design Starts by Gate Count, North America



Source: Dataquest (December 1992)

G2001965

based upon our research on the number of licenses users currently have, and the number they need, as shown in Figure 3-2.

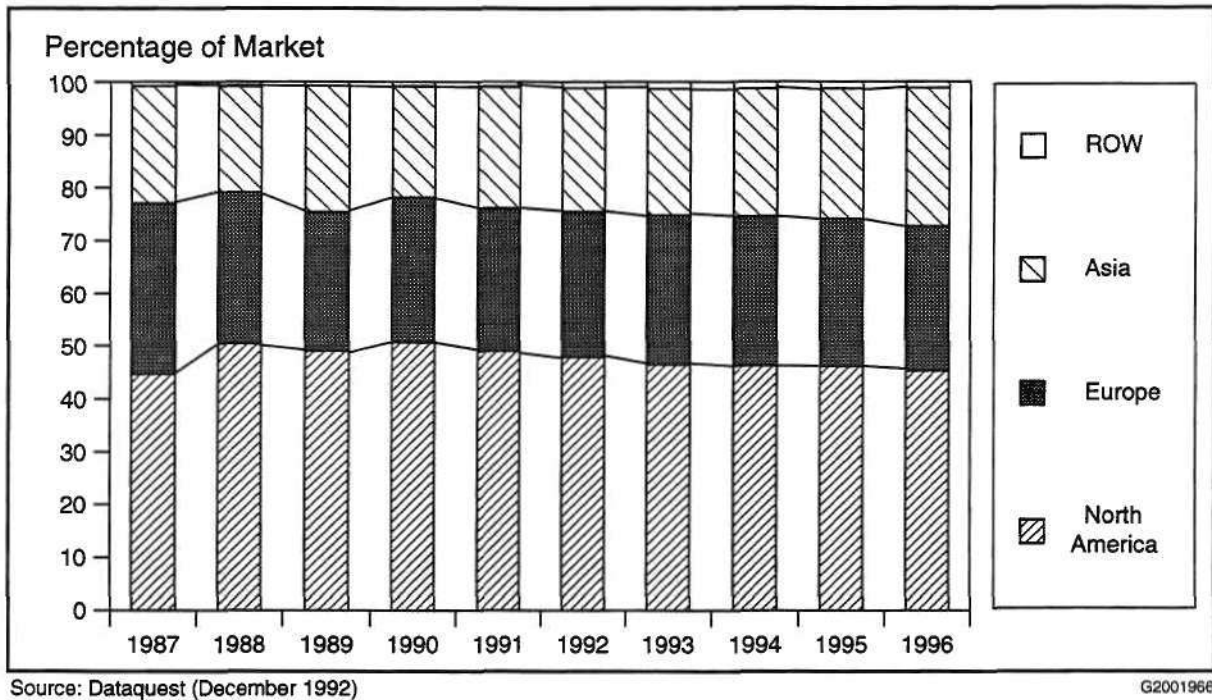
Regional Effects

Dataquest anticipates that North America will continue to be the largest consumer of CAE software tools, as shown in Figure 3-5. This conclusion is based on our end-user research, which shows that, on average, system complexity is greater in North America than its regional counterparts. Indeed, 1991 showed that typical ASIC gate densities were 25,000 gates in North America, compared to 18,000 in Japan. The number of signal layer per board was, on average, 47 percent higher than those in Europe and Japan. Due to the complex nature of these designs, EDA vendors will find that users in North America are willing to pay higher prices for sophisticated tools that solve their system design problems.

Logic Synthesis Market Forecast

The logic synthesis market continues to experience robust expansion, despite few vendors with mature product offerings. During the past three years, the leading players in the EDA industry have been unable to mount a serious threat to Synopsys' market position. Synopsys has

Figure 3-5
CAE Software Regional Consumption History and Forecast



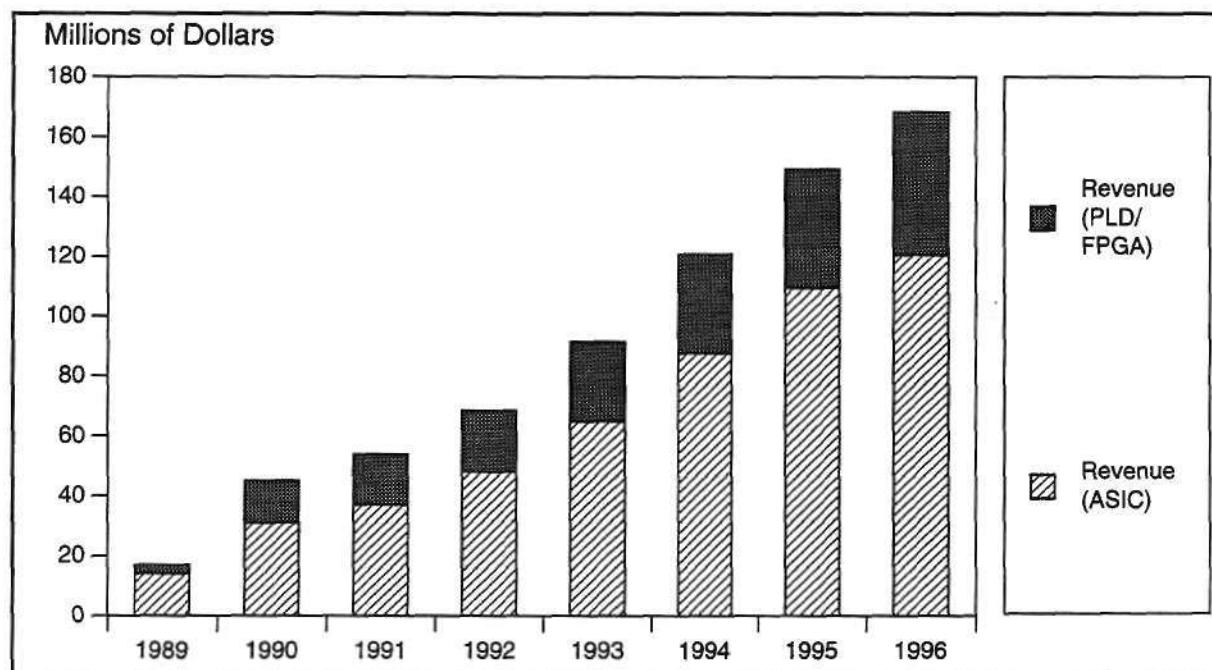
been the source of most of the growth during this period, and Dataquest anticipates that its position will remain strong for the coming 12 to 18 months.

We expect that the logic synthesis market will continue to show strong revenue growth for the foreseeable future. Indeed, our end-user research reveals that users have a demand for increasing the number of logic synthesis licenses by almost 90 percent, as shown in Figure 3-2. However, by early 1994 we anticipate that the industry will be filled with an abundance of competent suppliers, addressing a broad range of synthesis capabilities. At that point we feel that the market will experience substantial price erosion. The impending supply-side fragmentation will undoubtedly diminish both revenue and profit opportunities. We feel that logic synthesis will continue to show rapid growth rates, with year-to-year growth in the 20 to 35 percent range. Dataquest believes that the total logic synthesis market will reach \$180 million by 1996 (see Figure 3-6).

Design Entry Forecast

Dataquest's research shows that the traditional gate-level schematic entry market has reached a point of maturity and is moving into a period of decline. The technology has become a commodity, and the market is virtually saturated. Dataquest's historical data show that digital schematic entry has begun its decline, with 1991 revenue down 11 percent from the 1990 revenue of \$160 million. We believe that the

Figure 3-6
Worldwide Logic Synthesis Software Market History and Forecast



Source: Dataquest (December 1992)

G2001967

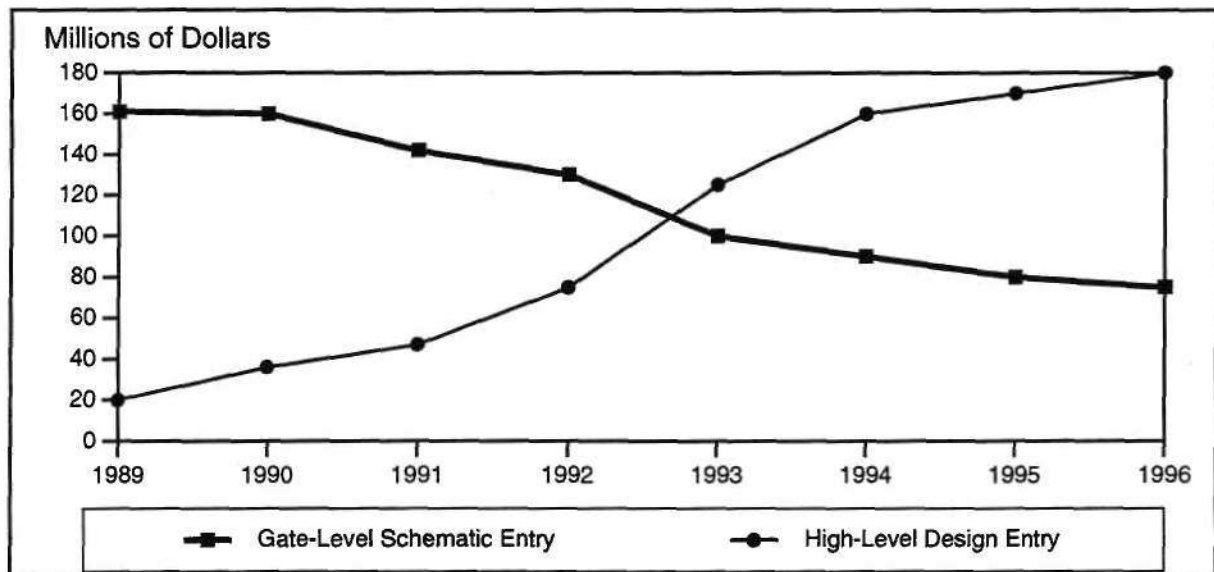
gate-level schematic capture market will experience a steady decline during the next five years, as shown in Figure 3-7.

Fast on the heels of the schematic entry market is the technology that is replacing it, namely, HDL entry. This category of tools includes text editors, source debuggers, syntax checkers, and user interface software needed for designing with VHDL and Verilog HDL. Our research indicates that this segment is experiencing rapid expansion and will continue to exhibit strength during the next two to three years. As a case in point, certain electronic system companies now design solely in HDL. However, Dataquest believes that a graphical representation is the most intuitive way to describe a concurrent system, and most designers use a combination of graphics and textual entry.

The graphical capabilities of next-generation entry products will be integral to improving design productivity. This next generation of graphic design-entry technology will enable designers to use a building block approach whereby the individual blocks are a combination of VLSI functions described in HDL, compilers, and hardwired core functions.

With HDL blocks, designers will reuse and modify existing blocks for subsequent designs, as well as create new blocks to meet the demands of the project. The HDL functions will also be represented as graphical blocks, but the designer will be given the freedom to quickly access and modify the blocks' internal HDL.

Figure 3-7
Worldwide Design Entry Software Market History and Forecast



Source: Dataquest (December 1992)

G2001968

Design Simulation Software Market Forecast

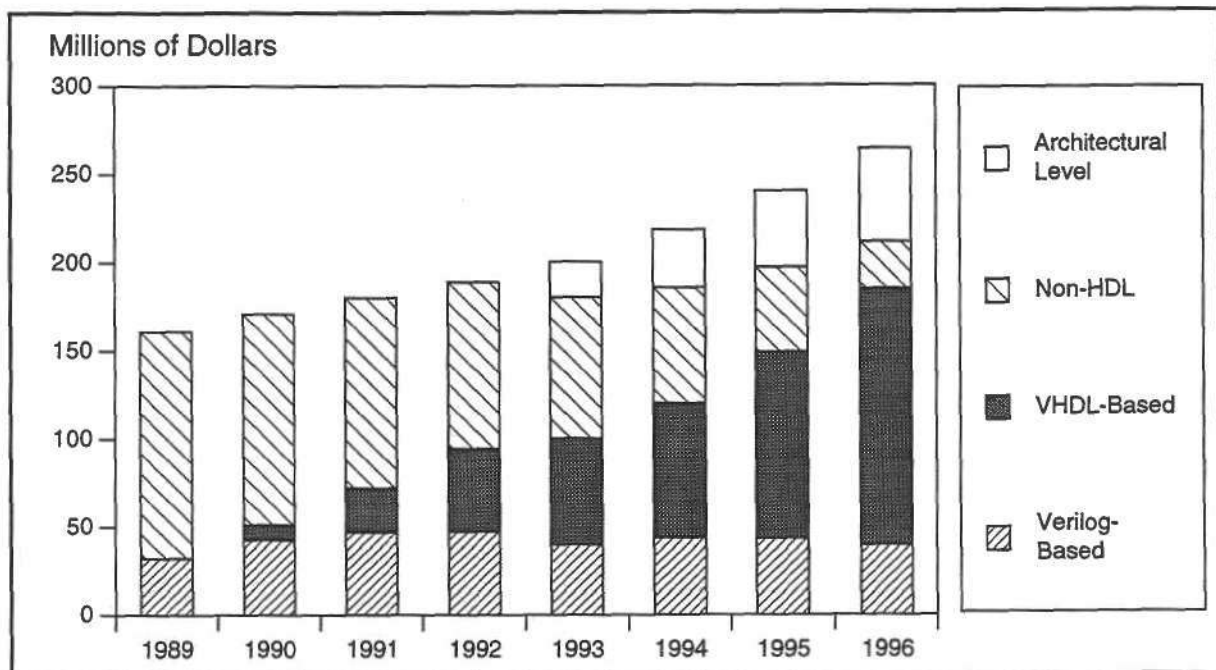
According to Dataquest's end-user research, the market cites simulation as the most important weapon in its CAE arsenal. This piece of the design puzzle, recognized by electronic designers as the most critical, makes it a logical place for EDA vendors to pursue opportunities. And yet, despite this importance rating, the digital simulation market has had a slow growth rate, with 1990 revenue increasing only 6 percent compared to 1989, and 1991 revenue increasing only 5 percent compared to 1990, as shown in Figure 3-8. So, with the digital simulation market stalling at \$180 million, is there an opportunity to increase the amount of simulation tools purchased by electronic designers?

Dataquest believes that simulation has a potential upside. The sluggish performance may be attributed to the fact that few simulators had met the following user demands:

- Fast gate-level execution speed
- Mixed-level simulation capabilities
- Strong modeling/design language
- Standard modeling language
- ASIC library support

With many companies in the EDA industry now shipping simulation products that have cleared some or all of the above hurdles, the simulation market is ready to expand, albeit modestly, during the next five years. Our end-user research indicates that electronic designers have a

Figure 3-8
Worldwide Digital Simulation Software Market History and Forecast



Source: Dataquest (December 1992)

G2001969

demand to increase the number of licenses of simulation tools by 8 percent, driven by European designers. Adding to the potential digital simulation upside is the replacement of gate-level simulators with mixed-level technologies. We estimate that approximately 75 percent of simulation licenses installed are non-HDL-based simulation licenses. The market for non-HDL-based simulators is declining quickly in the face of the trend toward top-down design. We believe that electronic design companies will aggressively replace these licenses with HDL-based mixed-level simulation products.

Fueling additional growth will be the advent of architectural simulation tools. Verification tools in this category are those that will enable the user to simulate and verify designs at a higher level than that traditionally available (for example, tools that allow computer designer to determine the optimal number of processors and cache size for a multiprocessor design, given a fixed bus bandwidth).

Dataquest Perspective

Dataquest believes that short-term growth in the CAE market will be driven by two areas: the increasing adoption of top-down design methodologies, and the increasing need for sophisticated analysis tools, including test automation, signal integrity, and timing verification. Looking past the impact of these tools, a coming wave of system-level, or architectural tools, will pave the way for growth in the latter half of this decade. Dataquest believes that there is still an opportunity to capitalize on the growth of the top-down design market, but as more competitors enter the fray, average selling prices will decline.

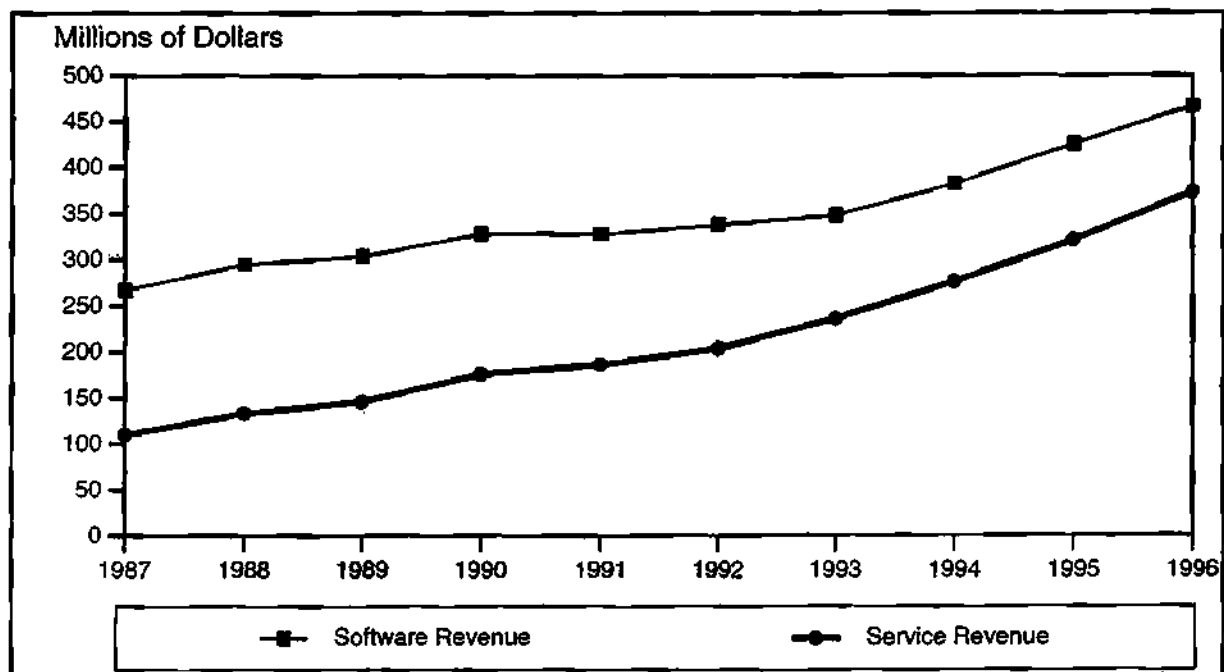
Chapter 4

PCB Market

Introduction and Forecast

The PCB/MCM/Hybrid market shows sign of continued stagnation. Dataquest classifies products as "PCB/MCM/Hybrid" when they are used to create the placement and routing of the traces and components laid out on a variety of substrate media, including traditional PCB and hybrid technologies, as well as multichip module (MCM) substrates. Additionally, Dataquest currently classifies PCB thermal analysis tools in this market. As shown in Figure 4-1, Dataquest anticipates only modest short-term growth in this saturated market. However, by 1994 we believe that clock speed and integration necessities will increase the usage of MCM layout tools, which should improve software revenue.

Figure 4-1
Worldwide PCB/MCM/Hybrid Software and Service Market History and Forecast



Source: Dataquest (December 1992)

G2001870

Driving Forces

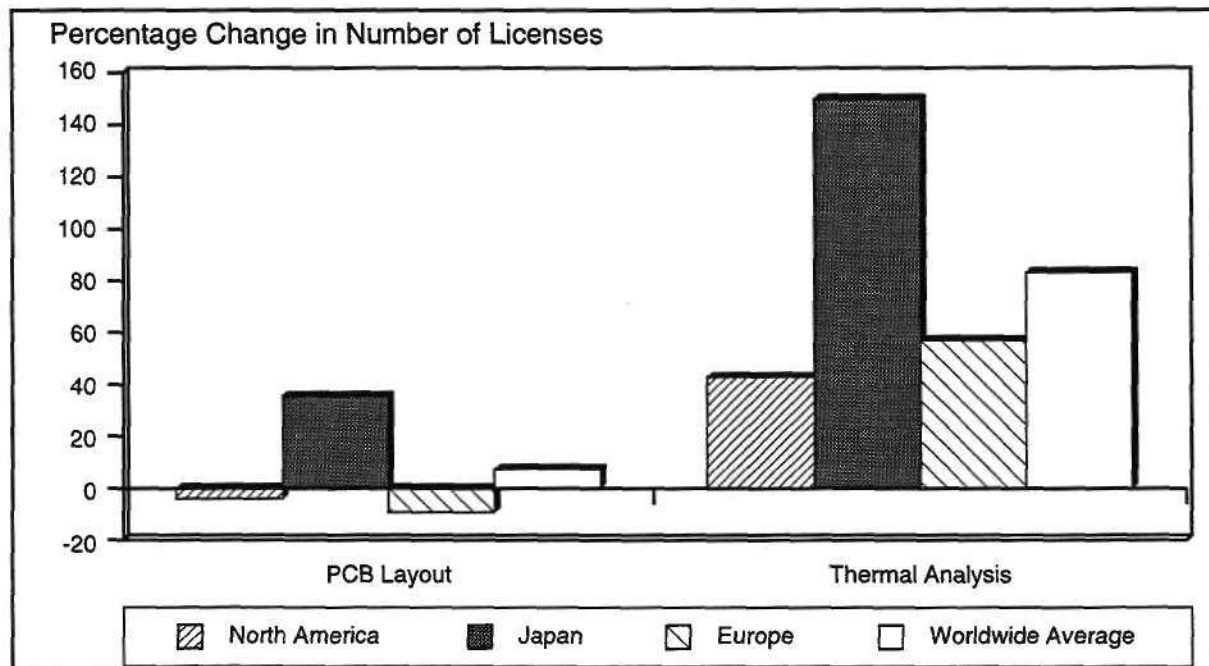
At the present time, there is little excitement occurring at the layout level, and Dataquest research shows that there will be little growth in the near term. Indeed, our end-user research shows that users do not anticipate increasing the number of licenses of PCB layout products, as shown in Figure 4-2. As reported in earlier publications, a limiting factor to the increased usage of PCB layout tools is the lack of a widespread trend to decrease board size. In the ASIC world, design-start gate densities continue to increase dramatically, requiring new productivity enhancement tools, although our research has determined that board design sizes will not experience a widespread decrease in size. Additionally, this force would not necessarily be enough to supplant the number of companies that are farming out the layout of their simpler board designs. Dataquest believes that there is a potential for opportunity in what may now be classified as a saturated PCB/MCM/Hybrid layout market. We anticipate that the following areas may breathe some life into the PCB/MCM/Hybrid market:

- MCM Technology Acceptance
- Thermal Analysis Tools

MCM Technology Acceptance

The multichip module is emerging as one of the most important packaging technologies since the advent of surface mount devices, and Dataquest anticipates that this technology will find increasing use in all electronic sectors. This technology demands new

Figure 4-2
Percentage Difference in Number of Licenses Owned versus Number Needed,
PCB Applications



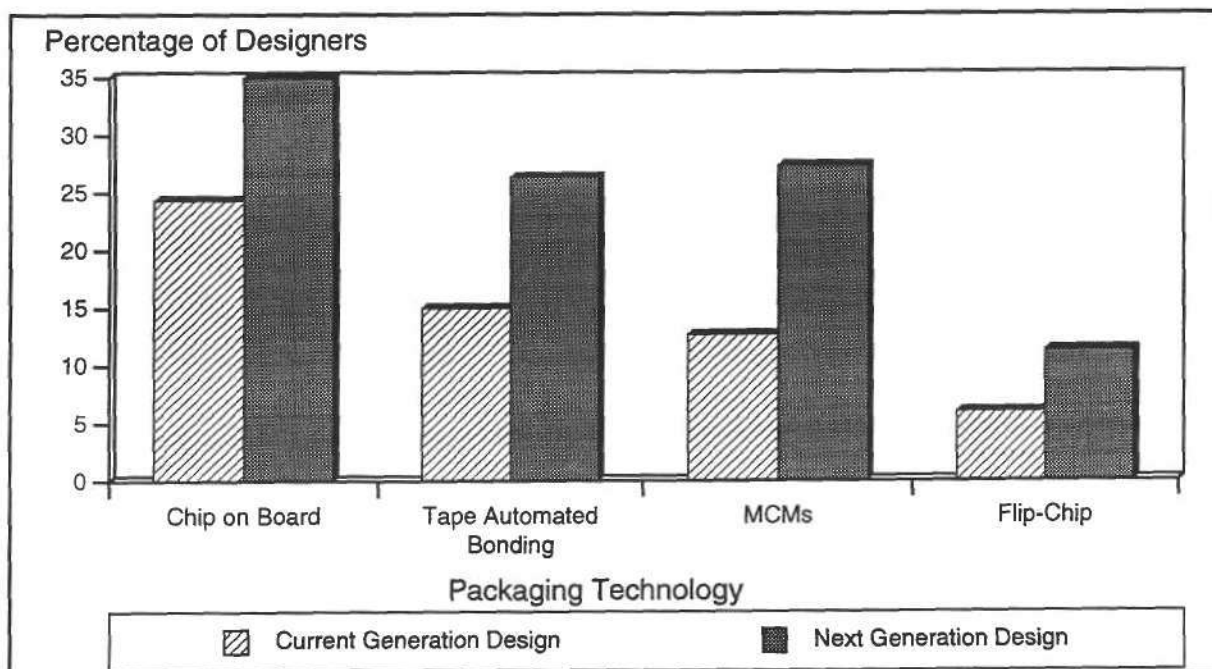
Source: Dataquest (December 1992)

G2001971

electronic design automation tools, and many vendors are quickly supplying tools targeted toward these applications. The forces driving the adoption of MCM technology include the following:

- **System interconnect problems**—The interconnection of ICs possessing 400 or more pins using conventional printed circuit boards lead to one conclusion: The large board area occupied by PCB tracks can negate the high levels of integration achieved within the IC. As shown in Figure 4-3, users anticipate to utilize increasing more sophisticated packaging technologies. In this case, either large areas of the board cannot be used for components because of the density of copper track or large numbers of layers must be used.
- **Increase in system speed**—System clock frequencies are anticipated to increase tenfold during the next 10 years. We currently see mainframe computer manufacturers turning to MCM technologies to facilitate interchip communications. These companies are typically early adopters of new technology, and techniques used in these applications are typically used two to three years later by the mainstream design community.
- **Mixed signal opportunity**—The mixed signal design market shows some potential to become an early adopter of MCM tools. In certain situations, it will be more appealing to combine analog silicon (based upon a process optimized for bipolar analog circuits) with digital silicon (based upon a process optimized for CMOS digital logic) upon an MCM substrate, instead of producing a monolithic mixed-signal device.

Figure 4-3
Anticipated Usage of Advanced Packaging Techniques



Source: Dataquest (December 1992)

G2001972

Yet these factors must be weighed against the economic issues associated with MCM design. At this time, MCM devices are relatively expensive, and are used only in situations where performance is an overriding factor on high margin products, like high-end computing and military applications. Dataquest believes that the first large potential market for MCM design tools exists at current silicon suppliers, which have the capability of amortizing the cost of MCM design and production over large volumes. So far, we have seen few IC vendors invest heavily in this technology; but, stay tuned.

The use of MCMs also involves a host of other issues that had heretofore have had little significance, including:

- **Testing**—Companies usually operate a multilevel testing strategy in connection with MCMs: testing the chip, module, PCB, and system. Testing is a major problem at the module level because chips are densely packed into a sealed unit and also at the chip level because it is difficult to test both bare dice and flip-chip packages. However, individual chips must be tested before assembly in order to minimize rework and repair. MCM design will require increased use of formal scan path methodologies, including JTAG and BIST.
- **Thermal analysis**—Thermal issues are intensified by the lack of sufficient thermal conduction from the die through the MCM substrate. We anticipate that this difficulty will fuel future growth of thermal analysis tools, as discussed later in this section.
- **Parasitic extraction/signal integrity**—The close proximity of signal-carrying tracks combined with the high frequencies at which MCMs operate will inevitably require sophisticated analysis tools. Areas of concern will include crosstalk, reflection, characteristic impedance, and extraction of second- and third-order effects.

Due to these issues, one would believe that IC layout would, with rather little modification, be applicable to MCM design. Unfortunately, MCM substrates are much larger than the typical IC die. Also, existing three-level metal tools would need to be extended to allow more than 20 interconnect layers. On the other hand, PCB design software, which is capable of large dimensions and many layers, is not typically suitable for track/gap dimensions of less than 3mm.

Indeed, current approaches of MCM design tool vendors leverage their expertise in either IC or PCB layout. Dataquest believes that MCM tools will begin to show substantial growth in the 1994 time frame, when MCM-specific tools converge with an economical approach to the use of MCMs. This is the basis for our optimistic growth projections in that time frame.

Thermal Analysis Tools

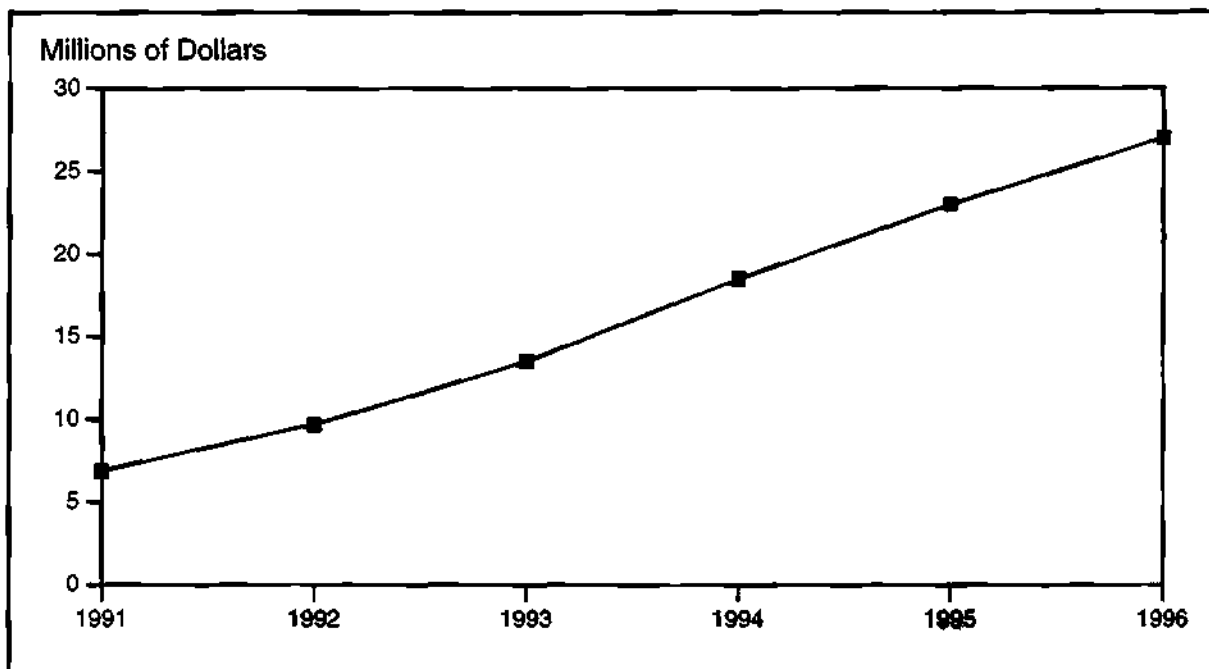
Dataquest believes that the following factors should drive the increase in usage of thermal analysis products:

- **Increasing clock speeds**—Whenever a transistor switches between two voltage levels in a digital circuit, it briefly passes through a linear mode in which the power dissipated in the device rises sharply. As the operating frequency rises, devices spend an increasing proportion of time in this high power state. For this reason, power dissipation, and therefore heat, rises with increased frequency. Clock frequencies of electronic systems are forecast to rise tenfold during the next decade. Major thermal problems will result from this speed increase, driving the need for thermal analysis tools. The coming wave of 100-plus-MHz microprocessors is just the beginning. Digital Equipment Corporation's new Alpha-AXP microprocessor currently runs in ranges from 100 to 200 MHz, and can dissipate 30 watts of power. A 1-GHz version planned for 1994 will dissipate 175 watts, almost enough to let you read a book.
- **Multichip modules**—As previously discussed, the emergence of this technology will drive the increased use of thermal analysis tools. The characteristic of MCMs, naked dice in close proximity, running at high operating frequencies, will cause severe thermal problems. These difficulties are intensified by the growing use of solder-bump flip-chip device packaging and assembly, since the major heat-transfer path is through the solder bumps. Current solutions include the emergence of thermal vias, which are metal connections whose sole purpose is to conduct heat away from the dice. The required numbers and placement of these vias will need to be calculated by thermal analysis tools in the future.

Currently thermal analysis tools are in the hands of those companies that have been early adopters of EDA technology, mainly mainframe computer and military/aerospace industries. However, a growing need exists in the automotive, consumer electronic, and telecommunications areas.

Dataquest currently estimates that the PCB thermal analysis market is valued at \$6.9 million in 1991; approximately 300 units shipped at an average selling prices (ASP) of \$23,000, although we believe that 10 to 15 percent of these shipments are not actively used at this time. Many copies of thermal analysis software have been bundled into larger orders or have been purchased for evaluation and curiosity reasons, and we believe that a significant number of these licenses have never been used. However, Dataquest anticipates that PCB thermal analysis tools will become mandatory at suppliers of high-performance electronic systems. Figure 4-4 shows that this market will experience good growth, reaching a market size of \$27 million by 1996.

Figure 4-4
Worldwide PCB Thermal Analysis Market Forecast



Source: Dataquest (December 1992)

G2001973

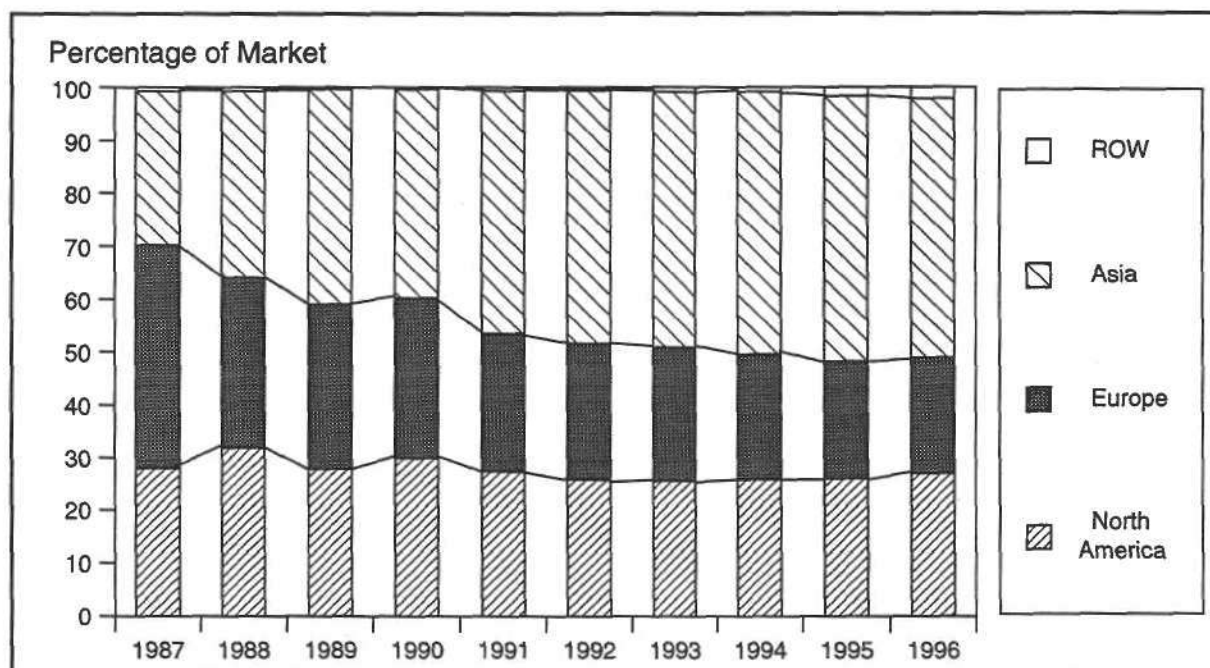
Regional Effects

As shown in Figure 4-5, Asia continues to grow in its consumption of PCB/MCM/Hybrid tools. Much of this growth can be attributed to the rise in prominence of Zuken as a supplier of PCB and mixed signal layout tools to Japan. Dataquest anticipates that this rise in the consumption of PCB layout tools should stabilize within the next few years as excess demand is filled in Asia.

Dataquest Perspective

Clearly, the PCB/MCM/Hybrid layout market is saturated, and existing vendors that are lulled into a false sense of security will be caught unaware. Suppliers of PCB layout software must continue to improve their product offerings in order to maintain current market share and to penetrate other markets. Any future growth in this area will be fueled by the adoption of advanced packaging technologies, namely multichip modules. Dataquest believes that significant revenue from MCM tools will begin to be seen in the 1994 time frame.

Figure 4-5
PCB/MCM/Hybrid Software Regional Consumption History and Forecast



Source: Dataquest (December 1992)

G2001974

Chapter 5

IC Layout Market

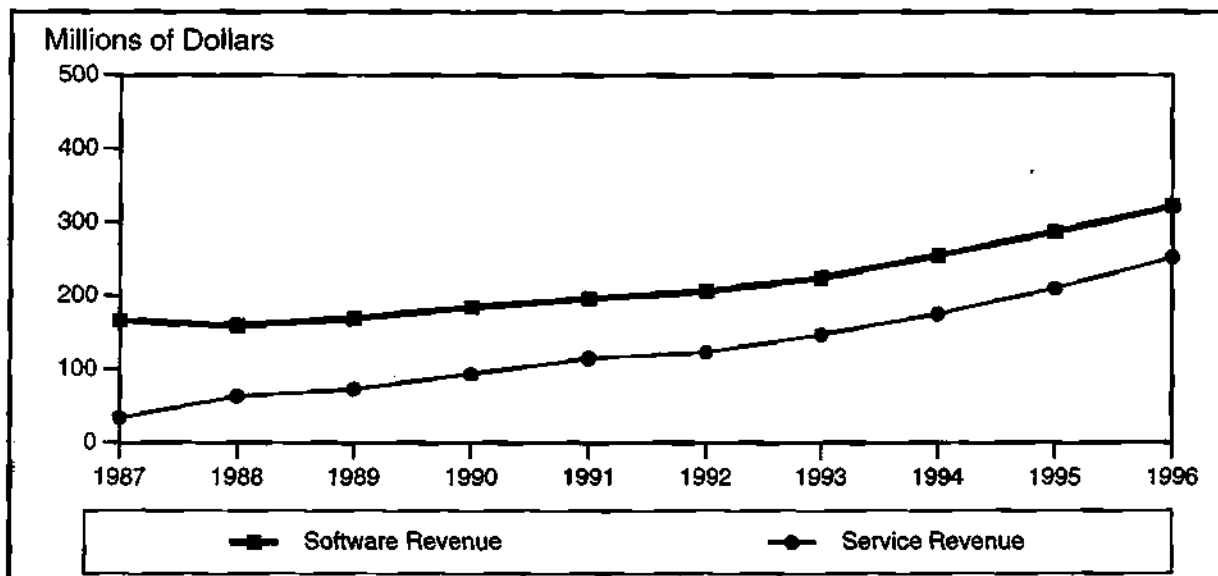
Introduction and Forecast

Dataquest classifies tools that are used to create and validate the physical implementation of an integrated circuit (IC) as IC layout software. The IC layout category includes polygon editors, symbolic editors, placement and routing software, design verification, compilers, and module development tools. The IC layout market has benefited from the stability of its supplier base, so that in 1991 it boasted the highest year-to-year software growth rate in EDA, a relatively unimpressive 6.2 percent. Dataquest projects a mild growth rate in this area in the range of 5 to 9 percent year-to-year growth for the short term, with growth rates reaching more than 10 percent in 1994, as shown in Figure 5-1.

Driving Forces

There is little demand for additional licensees of IC layout software (see Figure 5-2). Indeed, the most important factor that will drive

Figure 5-1
Worldwide IC Layout Software and Service Market History and Forecast



Source: Dataquest (December 1992)

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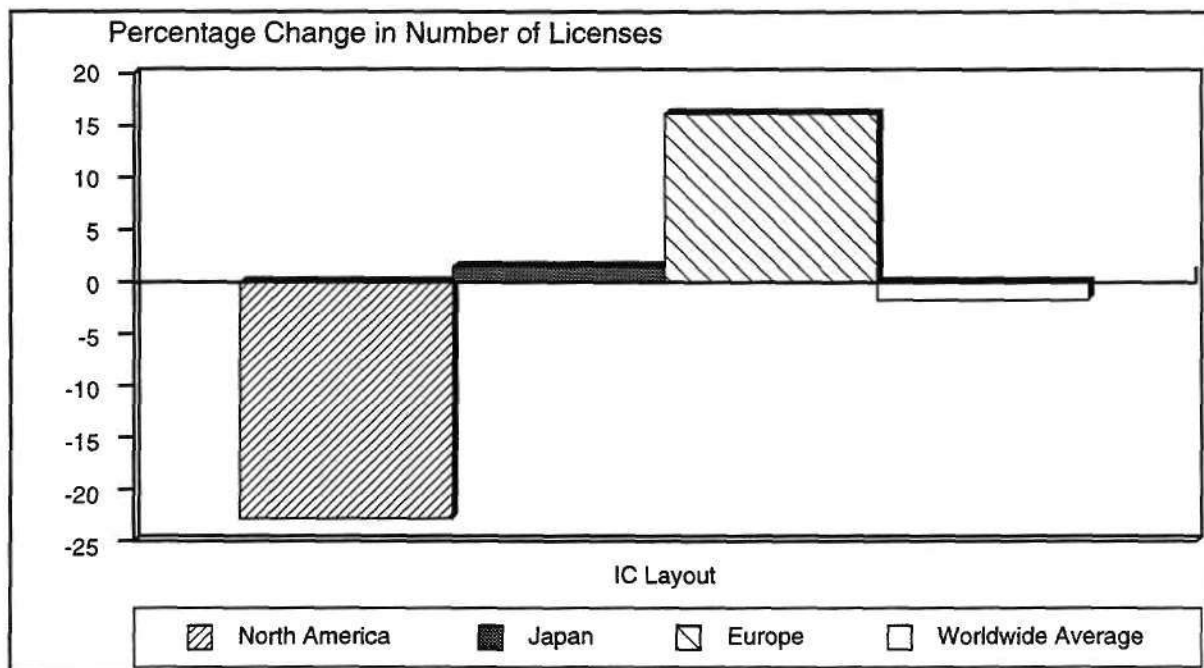
future growth is expansion of design activity in the semiconductor industry. Approximately 50 percent of IC layout tools are sold into the commercial semiconductor industry. Forces that will drive the future growth of IC layout software are as follows:

- Vendor stability
- Semiconductor market dynamics
- Emerging tool opportunities

Vendor Stability

The original founders of IC layout software, Calma and Applicon, gave way to newer technologies provided by a plethora of upstarts. At one point, Dataquest tracked more than 20 different companies providing IC layout tools. We are now in a renewed state of stability, with huge market power being held by only two companies, Cadence and Mentor Graphics. Indeed the Cadence/Valid combination held more than 60 percent of the market, with Mentor Graphics contributing an additional 17 percent. In no other section of EDA is market share so heavily concentrated. By example, the top 15 suppliers in CAE must be combined to have a similar market share percentage that Cadence and Mentor Graphics currently share in IC layout.

Figure 5-2
Percentage Difference in Number of Licenses Owned versus Number Needed, IC Layout



Source: Dataquest (December 1992)

G2001976

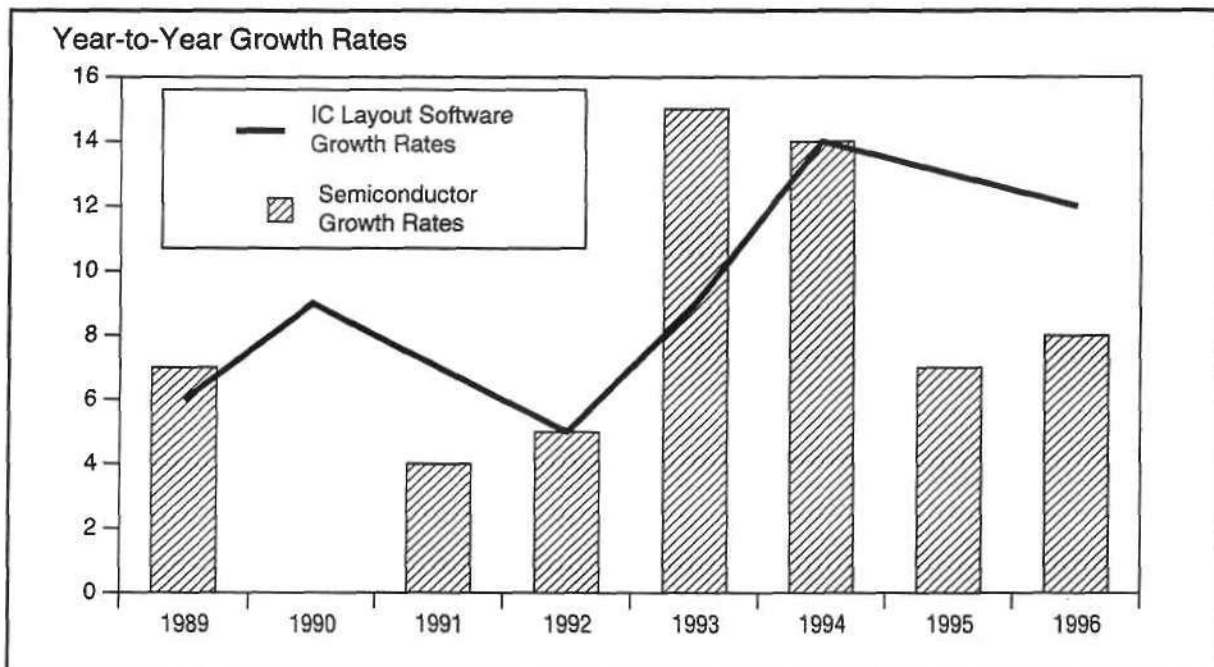
Industry stability is a double-edged sword. Dataquest anticipates that the industry's increased concentration and stability will help accelerate purchasing decisions during the next 12 to 18 months. However, these same purchasers are anxious to find alternate suppliers of superior products. Dataquest foresees new companies rising to challenge the existing market giants, offering innovative ideas to solve the historic IC challenge of increasing functionality and reducing die size.

Semiconductor Market Dynamics

The recent performance of the IC layout software market in the face of what had been a disappointing performance in the semiconductor industry shows that a need for IC layout tools continues. As shown in Figure 5-3, IC layout software year-to-year growth rates outperformed the semiconductor industry's growth rates for the past two years. This continued investment in IC layout technology by semiconductor suppliers will help provide additional growth as the IC market experiences a forecast upturn in the next two years. As shown in Figure 5-4, the semiconductor industry consumes 50 percent of IC layout software.

The continued growth of the IC layout software market reinforces our belief that rumors of free silicon are greatly exaggerated. In fact, Dataquest anticipates that the need for improved layout software will increase. Based upon our end-user research, increasing the

Figure 5-3
Comparison of IC Layout Software Growth Rates versus Semiconductor Growth Rates



Source: Dataquest (December 1992)

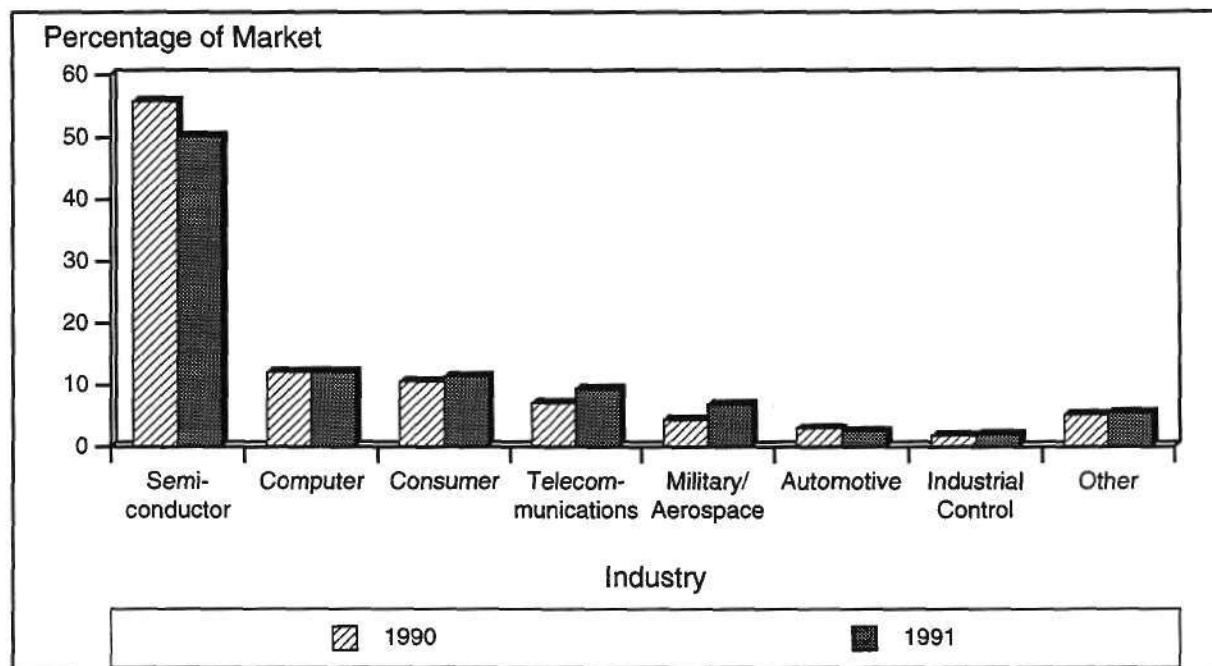
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functionality of electronic systems is the second most important factor to market success, trailing the need to improve time to market. This functionality will be increased at the silicon level, as component counts of typical systems is not forecast to increase, and in fact will show a steady decrease of approximately 10 percent in North America.

Additionally, electronic system providers are focusing their sights upon the consumer marketplace. The revenue opportunity to outfit every business person with some type of electronic assistant is staggering. The cost and size considerations associated with supplying product to the consumer market will require increased attention to squeezing the last ounce of functionality in the shortest amount of design time. This bodes well for suppliers of automatic place and route (APR) software.

In fact, Dataquest feels that APR software will fuel growth in the traditional IC layout tools. In 1991, APR software tools showed a revenue increase of 28 percent over 1990. These tools now supply 29 percent of IC layout software revenue, and Dataquest foresees that these tools may contribute up to 40 percent of the IC layout software market by 1996. This transition toward automatic IC layout tools is driven by the need to reduce design cycles and improve time to market, the single most important factor in achieving market success, according to electronic designers. Dataquest believes that traditional semiconductor houses are moving from full custom layout tools toward APR tools in response to this. It is

Figure 5-4
IC Layout Software Consumption by Industry



Source: Dataquest (December 1992)

G2001978

possible to foresee the day when only extremely high volume standard parts such as microprocessors and DRAMs will be designed using full custom techniques.

Emerging Tool Opportunities

Dataquest believes that significant opportunity exists to bring new technology to bear upon the design cycle problem, namely floorplanning tools. Historically, advancement in the process for developing ASIC has been in two distinct areas. The first area is the IC layout section, where incremental improvements are made to APR tools, including such advances as multilayer metal, more efficient algorithms, and constraint-driven placement. The second area is in the CAE arena, where great strides have been made in improving the ASIC designer's productivity, by supplying him with top-down design solutions. Yet little progress has been made in the communication between these two areas, and currently the majority of designs are transferred from the ASIC designer to the foundry using a connectivity netlist and little else.

Dataquest believes that properly designed floorplanning tools have a significant market potential. This will be the first time that IC layout technology will be migrated toward the electronic system designer. Floorplanners used in conjunction with a top-down design methodology can significantly improve the optimization of synthesis tools, and improve first-pass success through back-end APR tools. Additionally, improved timing estimation provided by floorplanners will enable the designer to design more aggressive systems.

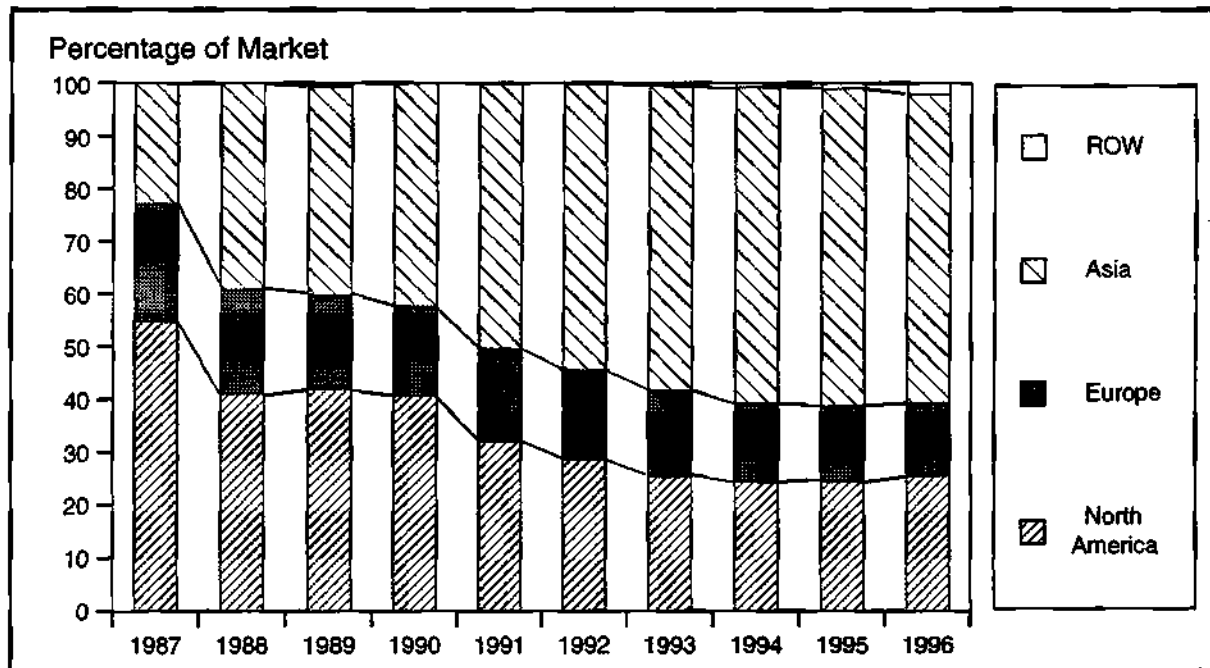
For floorplanners to be successful, they must be targeted for the logic designer. One often-cited flaw of existing proprietary floorplanners is the fact that they require intimate knowledge of silicon design. Other factors necessary for floorplanning success include a low price point. Dataquest believes that a floorplanner priced in the \$15,000 to \$30,000 range will have optimal acceptance.

Dataquest research shows that by 1996 there will be upwards of 20,000 designers using top-down design methodologies to develop ASICs. A floorplanning tool is not the type of tool that will exist on every designer's desk, but rather will be a focal point for system-on-a-chip design. Therefore, the potential is for 2,000 seats of floorplanning tools that provide the proper benefits. Additional seats for floorplanning tools may be found in merchant IC vendors, as they migrate toward ASIC design methodologies.

Regional Effects

Asia has been the catalyst for growth in the IC layout market. As shown in Figure 5-5, Asia currently accounts for 50 percent of the consumption of IC layout tools. Dataquest anticipates that this trend will continue as more IC manufacturing and ASIC vendor power moves eastward.

Figure 5-5
IC Layout Software Regional Consumption



Dataquest Perspective

The IC layout market will continue to fare well in the face of poor global economic performance and total EDA software sales. Dataquest believes that the need to place increasing system functionality at the silicon level will fuel moderate growth rates. In addition, the opportunity to migrate IC layout technologies to mainstream ASIC designers via floorplanning technologies should help spur growth in the mid-1990s.

Dataquest®

DB a company of
The Dun & Bradstreet Corporation

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
United States
Phone: 01-408-437-8000
Facsimile: 01-408-437-0292

Dataquest Incorporated
Dataquest/Ledgeway
The Corporate Center
550 Cochituate Road
Framingham, Massachusetts 01701-9324
United States
Phone: 01-508-370-5555
Facsimile: 01-508-370-6262

Dataquest Europe Limited
Roussel House Broadwater Park
Denham, Near Uxbridge
Middlesex UB9 5HP
England
Phone: 44-895-835050
Facsimile: 44-895-835260/1

Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa Chuo-ku
Tokyo 104
Japan
Phone: 81-3-5566-0411
Facsimile: 81-3-5566-0425

Offices in
Costa Mesa, Munich,
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Representative Agencies in
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Market Statistics

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File behind the *Market Statistics* tab inside the
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Design Automation Applications.**

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Electronic Design Automation Applications Forecast Update

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Electronic Design Automation Applications Forecast Update

Introduction

Proving no more immune to the current economic environment than the economy as a whole, the CAD/CAM/CAE/GIS market turned in a relatively sluggish performance during the first half of 1992—continuing the trend of 1991. Financial results comparing first-half 1992 results for a select group of publicly held CAD/CAM/CAE/GIS companies showed flat-to-negative growth results. As a result of this and other factors, the updated compound annual growth rate (CAGR) for CAD/CAM/CAE/GIS total factory revenue during the forecast period, 1991 to 1996, has been lowered to 7 percent from our previous forecast of more than 9 percent last spring. Table 1 shows the updated forecast for the CAD/CAM/CAE/GIS market by region.

This forecast update is based on the CAD/CAM/CAE/GIS group's recently updated market information. (The 1991 market totals will match in both the market share tables and forecast tables.) Any changes in market conditions have also been incorporated into this updated forecast. The following analysis outlines the reasons supporting this CAD/CAM/CAE/GIS market forecast.

This document contains Dataquest's detailed forecast information on the CAD/CAM/CAE/GIS industry. Included in this document are the following:

- Five-year historical data
- Five-year forecast data

Table 1
CAD/CAM/CAE/GIS Market, by Region

	1991	1992	1993	1994	1995	1996	CAGR (%) 1991-1996
Worldwide							
Revenue	14,850	15,303	16,311	17,740	19,411	21,050	7.2
Systems	589,615	650,470	729,670	810,890	881,380	945,880	9.9
Seats	619,932	674,800	750,780	829,200	897,430	960,090	9.1
North America							
Revenue	5,027	5,141	5,415	5,834	6,313	6,803	6.2
Systems	240,985	265,850	290,470	315,390	336,940	358,450	8.3
Seats	252,860	275,470	298,720	322,610	343,350	364,230	7.6
Europe							
Revenue	5,486	5,689	6,122	6,666	7,325	7,929	7.6
Systems	208,812	229,300	261,950	294,250	320,240	340,700	10.3
Seats	219,677	238,080	269,800	301,100	326,300	346,100	9.5
Asia							
Revenue	4,039	4,131	4,370	4,768	5,219	5,673	7.0
Systems	124,271	135,870	152,540	170,120	185,890	200,850	10.1
Seats	130,964	141,020	156,790	173,630	188,830	203,330	9.2
Rest of World							
Revenue	298	343	404	472	553	645	16.7
Systems	15,547	19,450	24,710	31,130	38,310	45,880	24.2
Seats	16,430	20,230	25,470	31,850	38,950	46,420	23.1

Source: Dataquest (October 1992)

More detailed data on this market may be requested through our client inquiry service.

Forecast Assumptions

Following are the main forces, worldwide and by region, driving the CAD/CAM/CAE/GIS forecast.

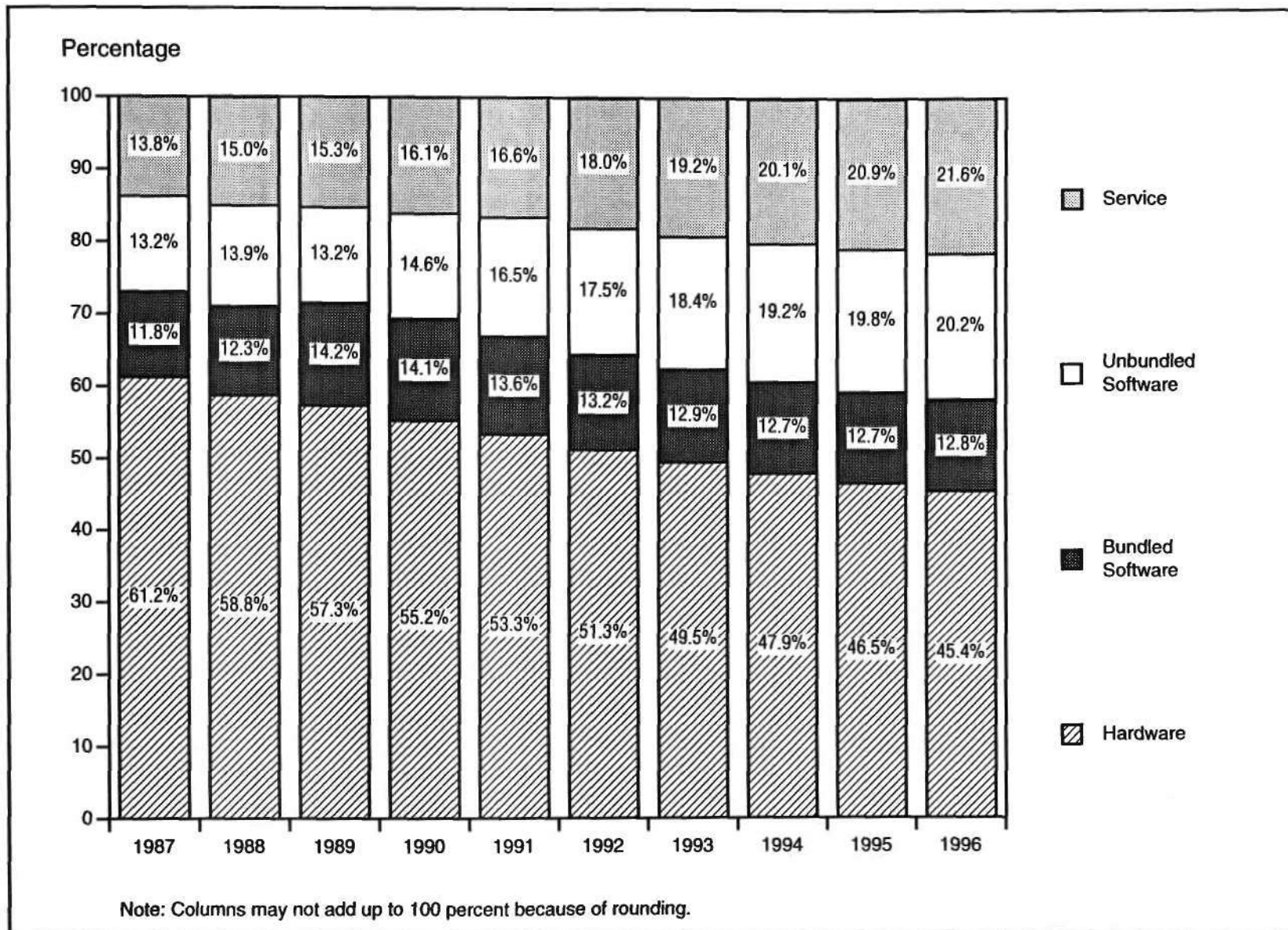
Worldwide Forecast Drivers

The worldwide CAD/CAM/CAE/GIS market will maintain consistent, steady growth during the next five years. Figure 1 shows the forecast change in mix among hardware, software, and services.

The following are the main forces driving the CAD/CAM/CAE/GIS worldwide forecast:

- Globalization of world markets is driving economic restructuring for the major regions—the United States, the European Community (EC) and Japan—to a degree unprecedented since the 1930s. Growth will be limited in the short term as CAD/CAM/CAE/GIS buyers assess market conditions. There is a sense of cautious optimism that the world economy will gradually improve, rather than get worse, beginning in mid-1993.
- CAD/CAM/CAE/GIS systems will continue to give buyers a competitive edge. As time-to-market requirements shrink, demand for design automation tools will continue to increase.
- The recent currency fluctuations, specifically the sharp decline of the U.S. dollar in relation to many European currencies and the Japanese yen, will offset sluggish economic growth for multinational corporations, particularly those with a high percentage of costs denominated in dollars. While many companies are hedging their profits to limit the effects of the currency fluctuations, some are utilizing the changes in exchange rates to reprice their products. In the current period of a rapidly declining dollar, U.S.-based multinationals may lower overseas prices to stimulate demand. This would be particularly true of the PC companies, which are striving to rapidly increase unit volume gains. For companies that have much of their cost structure denominated in dollars, the impact of currency will be highly leveraged. In the case of more mature companies that for the most part have established major manufacturing facilities overseas and therefore much of their cost structures are in foreign currency, the leverage from the change in the dollar is much less. Recent currency-rate changes may drive CAD/CAM/CAE/GIS growth internationally in the short term; long-term effects could be highly variable.
- Market demand will be limited by vendors' inability to fully meet demand for highly integrated software systems. We believe that the industry business model is evolving to a structure where large software vendors will function increasingly as application software integrators. Much of the innovation in new niche products can be expected to come from the small software vendors, who will be dependent on their OEM relationships with major software vendors. These alliances will ultimately reduce the total cost of software development, thus strengthening industry profitability. However, design problems being addressed will become increasingly complex, and meaningful success in integrating software will lag market demand.
- Increased flexibility in software portability will improve market stability during the next few years. Because the majority of software vendors have ported their products to multiple platforms, platform choice has become less of an issue. Software vendors are now poised to leverage their portability as new, faster hardware platforms become available. Those software vendors that do so will have a selling advantage.
- The "late majority" buyers for CAD/CAM/CAE/GIS will be coming to market during the next five years, driving additional growth. However, conservative buyers will favor market leaders. These conservative buyers are the "late majority" buyers who do not buy until the weight of the majority seems to legitimize the product. For vendors, therefore, the value of having high market share as well as financial clout will increase.

Figure 1
History and Forecast for the CAD/CAM/CAE/GIS Market: Hardware, Software, and Services



Source: Dataquest (October 1992)

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North American Forecast Drivers

The North American market was flat in 1991 at \$5.0 billion and is forecast to grow at a 6 percent CAGR through 1996 (see Figure 2). The main factors driving the North American forecast are the following:

- According to The Dun & Bradstreet Corporation's latest monthly survey of 1,000 manufacturers' nationwide, manufacturers' modest expectations for improvements in operating conditions were essentially unchanged, despite reports of improved conditions in the past few months. However, the one bright spot in the recent survey is that manufacturers' expectations to increase capacity in the next three months rose sharply. This bodes well for increases in capital spending. With the cost of capital so low, many companies are seeking to invest in systems and equipment that boost productivity. Market growth will increase as manufacturers invest in CAD/CAM/CAE/GIS systems.
- Market growth will be limited for the second half of 1992 and most of 1993 as businesses wait for the outcome of the November election and the implementation of new fiscal policies. Fiscal policy proposals include restoring investment tax credits, accelerating depreciation for many investments, and reducing capital gains. The budget deficit issue will also have to be addressed. Most likely, after the elections, some form of tax increases and/or spending cuts will occur. A Republican win would favor defense spending, which would help EDA and mechanical sales; a Democratic win would favor infrastructure spending (such as roads and bridges), which is more likely to benefit sales to AEC and GIS applications. Businesses will postpone purchases until they have a better indication of what the new policies will be and how they will affect their investment decisions.
- Market growth will be reduced because of decreasing average selling prices (ASPs). The United States is a large market with more developed distribution channels and larger order sizes than in other regions. Streamlined distribution channels leave fewer places for profit to hide; therefore, ASPs have declined more sharply. In contrast, Europe is the sum of many smaller country markets, each with its own customs and

requirements. Because of these special requirements, ASPs have not been as pressured to decline in European markets; therefore, North American unit shipments will continue to grow significantly, while revenue will grow at a slower rate because of strong price competition.

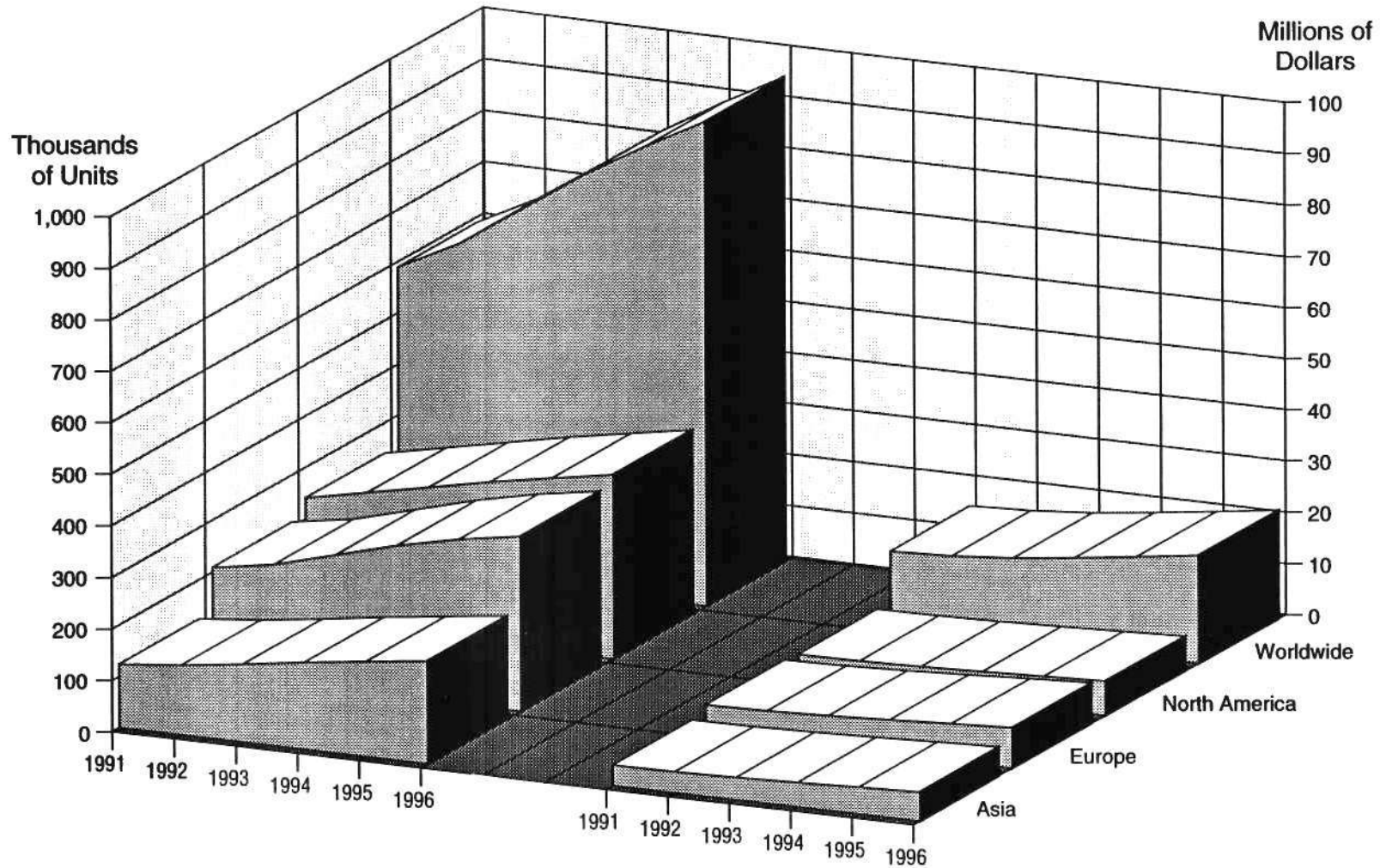
- Market growth will be limited because of lower defense spending. Spending cuts for the defense budget of 25 to 30 percent during the next five years are being proposed by the U.S. administration. In the United States, both Republicans and Democrats are seeking to balance defense spending cuts against the large forecast loss of jobs that will occur when such reductions are incurred. Most likely, the U.S. Department of Defense will encourage continued growth in R&D spending, while severely limiting the number of programs that would ultimately make the transition to production. CAD companies heavily dependent on direct or indirect government defense spending contracts increasingly will have limited growth opportunities.

European Forecast Drivers

The European market grew 4 percent in 1991 to \$5.5 billion and will reach \$7.9 billion by 1996. This market is forecast to have an 8 percent CAGR for revenue through 1996. The main issues driving the European forecast include the following:

- Growth will steadily increase in Eastern Europe. The collapse of the Soviet Union as an export market has complicated the difficult situation already facing other Central and Eastern European countries as they make the transition to market economies and establish new international trading arrangements. Poland, Hungary, and more recently Czechoslovakia have made impressive progress in shifting exports to other markets. In all these countries, prices have been set free and inflation seems to be coming under control. The initial groundwork toward adopting market economies has been laid. GDP/GNP growth is forecast to turn positive during the 1992 to 1993 period and reach strength toward 1994. As these countries' economies become market economies, CAD/CAM/CAE/GIS opportunities will increase, also.

Figure 2
CAD/CAM/CAE/GIS Market, by Region



- Growth will be relatively unaffected by the advent of the EC. The effects of 1992 will be evolutionary, not revolutionary. Growth is expected for European vendors as they expand into other European markets. To date, many European vendors have competed often only in their country of origin. During the next forecast period, European vendors increasingly will expand their operations to become more competitive across the European community. Furthermore, German companies and German subsidiaries of international companies increasingly are expanding into Eastern European countries.

Asian Forecast Drivers

The Asian market grew 4 percent in 1991 to \$4.0 billion and its forecast CAGR for revenue is 7 percent through 1996. The main issues driving the Asian forecast are as follows:

- In Japan, unexpected sluggishness has resulted from an abrupt end to the long boom of private fixed investment. This has followed a marked erosion of business confidence, partly associated with a continued unwinding of speculative activities in asset markets. CAD/CAM/CAE/GIS market growth will be limited in the short term as Japan recoups from these recent changes.
- Shifting labor costs will affect growth among countries. Labor costs in Japan, Korea, Taiwan, and Hong Kong will continue to increase, which will result in growing demand for productivity tools including CAD/CAM/CAE/GIS. Industries with blue-collar workers will transfer operations to Indonesia, Malaysia, the Philippines, Thailand, and the Republic of China; Japan, Korea, Taiwan, and Hong Kong will grow based on the work of the white-collar workers. Remote design and manufacturing sites also will encourage the growth of electronic-data sharing and thus CAD/CAM/CAE/GIS across Asia.
- Growth is less likely in some Asian countries because of the lack of stringent intellectual property rights. Most Asian countries, with the exception of Japan, have few laws governing intellectual property rights. Many companies will be hesitant to invest or set up operations in a region where they will receive no design protection.

Applications

Table 2 shows the CAD/CAM/CAE/GIS market software revenue forecast by application, as well as the forecast change in mix between bundled and unbundled software revenue. Figure 3 shows the CAD/CAM/CAE/GIS forecast by application.

Mechanical

The mechanical software market grew 7 percent in 1991, and its forecast CAGR for the 1991 to 1996 period is 5 percent. The main issues driving the mechanical forecast are as follows:

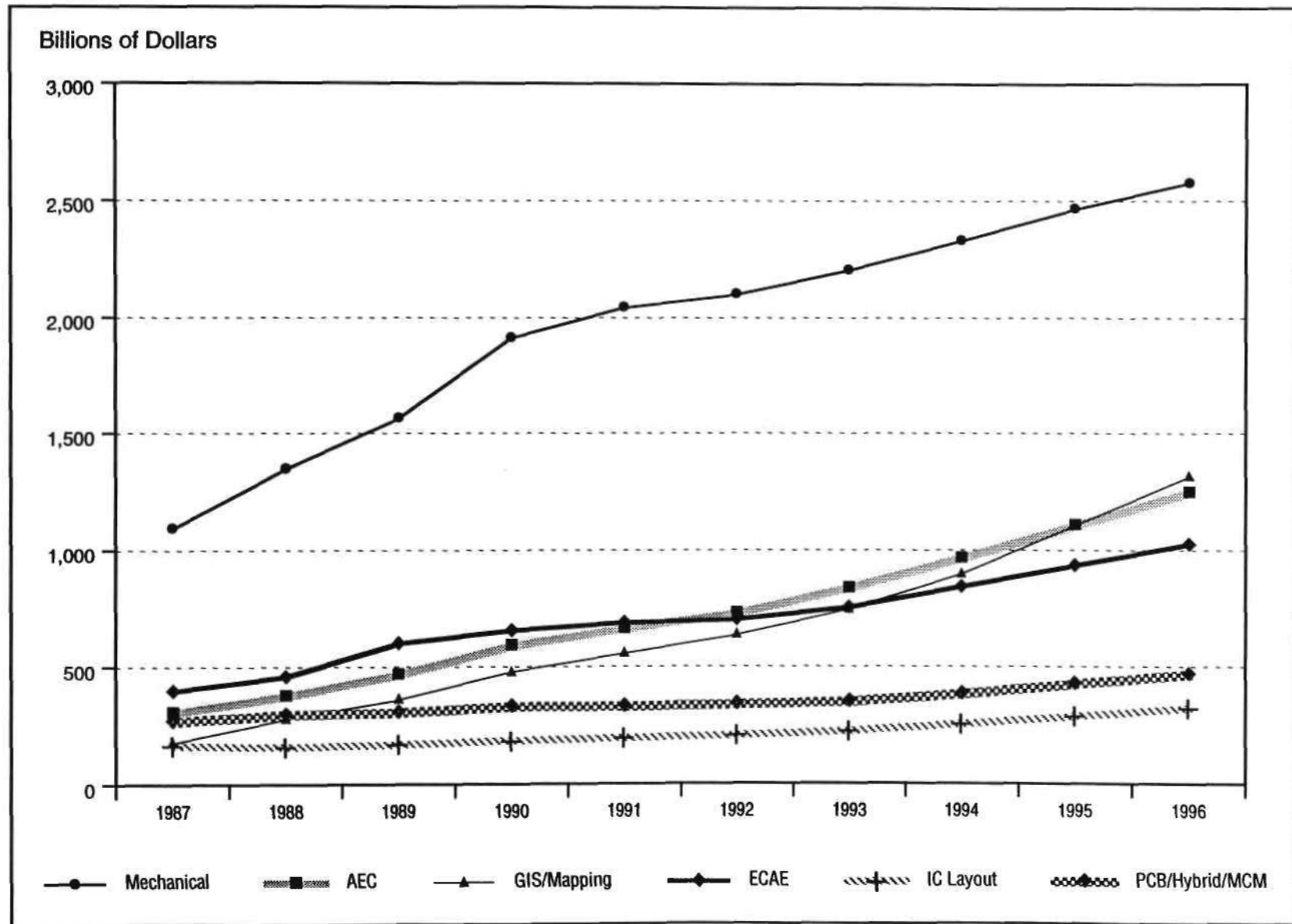
- Mechanical CAD/CAM/CAE indispensability is increasing. Market pressures to produce higher-quality, ergonomically correct designs with shorter production cycles is making mechanical CAD/CAM/CAE a necessity in all manufacturing industries. Several recent end-user surveys indicate the levels of drafting, conceptual, and detail design work done with mechanical CAD/CAM/CAE tools have surpassed 90 percent at many sites. The use of mechanical CAD/CAM/CAE tools in various departments also has high-market penetration. As the complexity of the design increases, the need to share information increases, and the benefits of automation improve dramatically. This results in an increase in the level of indispensability.
- Integration is driving significant savings. A hidden benefit when all potential users at a site have full access to mechanical CAD/CAM/CAE comes from the elimination of redundant processes or systems. Unfortunately, this is difficult to accomplish in a mechanical design and manufacturing environment because so many people need to have access to some part of the engineering database. It is difficult to even identify everyone, let alone actually set up a system that totally replaces the manual operation; but, it is happening. Slowly, a number of users are building integrated systems that effectively share engineering data between departments and supplier companies. Some vertical markets have taken this to the level of implementing standards for the sharing of data for a whole industry. The German automobile industry is a good example.

Table 2
CAD/CAM/CAE/GIS Market, by Application

	Revenue (\$M)						CAGR (%)	Percent Distribution (%)					
	1991	1992	1993	1994	1995	1996		1991	1992	1993	1994	1995	1996
All Applications													
Total Software	4,466	4,701	5,104	5,667	6,319	6,946	9.2	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	2,020	2,019	2,103	2,259	2,473	2,683	5.8	45.2	42.9	41.2	39.9	39.1	38.6
Unbundled Software	2,446	2,682	3,001	3,408	3,846	4,263	11.7	54.8	57.1	58.8	60.1	60.9	61.4
Mechanical													
Total Software	2,040	2,098	2,202	2,329	2,464	2,574	4.8	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	1,138	1,122	1,139	1,171	1,215	1,247	1.8	55.8	53.5	51.7	50.3	49.3	48.5
Unbundled Software	902	976	1,063	1,158	1,249	1,326	8.0	44.2	46.5	48.3	49.7	50.7	51.5
AEC													
Total Software	660	726	834	964	1,104	1,246	13.6	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	307	334	380	443	511	579	13.5	46.6	46.1	45.5	46.0	46.3	46.5
Unbundled Software	352	392	454	521	593	667	13.6	53.4	53.9	54.5	54.0	53.7	53.5
GIS/Mapping													
Total Software	556	634	743	896	1,105	1,315	18.8	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	276	311	358	426	528	639	18.3	49.6	49.1	48.2	47.5	47.8	48.6
Unbundled Software	281	323	385	470	577	676	19.2	50.4	50.9	51.8	52.5	52.2	51.4
Electronic CAE													
Total Software	686	700	752	841	933	1,024	8.3	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	131	104	95	90	86	90	-7.2	19.1	14.8	12.6	10.7	9.2	8.8
Unbundled Software	555	597	657	751	847	934	11.0	80.9	85.2	87.4	89.3	90.8	91.2
IC Layout													
Total Software	196	206	224	255	287	322	10.4	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	32	27	26	25	23	22	-7.4	16.3	13.3	11.5	9.7	8.2	6.8
Unbundled Software	164	178	198	230	264	300	12.9	83.7	86.7	88.5	90.3	91.8	93.2
PCB/Hybrid/MCM													
Total Software	328	338	348	382	425	466	7.3	100.0	100.0	100.0	100.0	100.0	100.0
Bundled Software	136	121	105	105	108	107	-4.8	41.5	35.7	30.2	27.4	25.4	22.9
Unbundled Software	192	217	243	277	317	360	13.3	58.5	64.3	69.8	72.6	74.6	77.1

Source: Dataquest (October 1992)

Figure 3
History and Forecast for the CAD/CAM/CAE/GIS Market, by Application



Source: Dataquest (October 1992)

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- The mechanical CAD/CAM/CAE market is evolving toward a replacement market. The next five years will see the mechanical CAD/CAM/CAE market evolve toward a replacement market where the new unit sales will be balanced by system retirements. This trend is inevitable. The only remaining question is when. We forecast 1997 or 1998 as the balance point. Considering the plethora of forces at work in emerging technologies, world economics, competitive issues, and software development, this should be considered a rough estimate.
- Significant changes are occurring for modeling technologies. Two-dimension-only systems are on a steady decline. Three-dimension capability is available for a minimal cost premium. Even if a user has few occasions for a 3-D application, the minimal expense and common availability on all platform types makes a 3-D-based product a reasonable alternative to 2-D-based products. Only a few recent 2-D-only products have added a significant amount of enhancements for parametric-user input and constraint-based modeling that may keep a significant market presence. This discussion does not intend to minimize the value or necessity of providing high-performance production drafting capabilities. The general message, however, is that the vendor revenue from this application is on the decline.
- Solid modeling has been promised for many years as the panacea for the design environment. More complete data structure with improvements in performance is rapidly building a strong following. Add-on applications that use part or assembly information are still less than optimal, but progress is being made in integration between the model and analysis applications, between the model and documentation, and further into manufacturing applications. Ease of use, performance, and the ability to accurately model any object independent of shape or manufacturing process continue to challenge all solid-modeling products.
- Knowledge-based engineering (KBE) is a productivity multiplier for any mechanical CAD/CAM/CAE system. The rules developed can drive automated applications, capture design intent, and automate sharing of data between applications and departments.

Every production operation has task and procedural structures that can be automated and optimized with KBE. The needed improvements in ease of use, cost of implementation, and availability of interface to a variety of mechanical CAD/CAM/CAE software products will improve with time. Two years ago, our first in-depth look at KBE made some wild predictions. We expected the market to grow by a factor of four in the next two years. A preliminary analysis now shows that this prediction was a bit optimistic. Doubled growth in two years would be closer to the truth. The general market softness has had an impact, but the underlying market dynamics are unchanged. In fact, the applications marked for early implementation are proving to be more successful than previously imagined.

- The promise of virtual reality (VR) and multimedia in an engineering environment is real. The practical applications are many. Training is a prime target for these technologies both as an aid to the proper use of other computer tools and in job content to make better engineers and designers. The state of the art in VR has reached the experimentation level of a new high-performance visual experience. The next phase will add the ability to do more than just fly around in your data. Dynamic editing will be required. Imagine doing cable routing by grabbing the end of a wire and flying through the engine compartment of your car.

AEC

The AEC CAD software market, which is forecast to grow at a 14 percent CAGR for 1991 to 1996, will enjoy healthy underlying demand during the forecast period because of the following factors:

- We anticipate increased demand for electronic design data from designers' clients and partners in the building process—from the U.S. government to the small commercial developer. Designers in the AEC industry are finding themselves in markets that are more regionally and globally competitive, markets that favor partnering across design disciplines. The designer with no CAD capability increasingly will be dropped from consideration as a partner or supplier.

- We anticipate increased demand from designers' clients and partners to reduce uncertainty and risk; that is, to build what the client had in mind, on time, and within budget. Meeting this challenge will require electronic design data throughout the design/construction process.

These two factors will continue to stimulate growth in the AEC CAD market during the next five years, even in a recession. Temper- ing this growth will be the following fun- damental factors that discourage purchases:

- Despite significant consolidation and partner- ing among users, the design and construc- tion process will still often be divided among several companies representing different aspects of the design process. Because automation systems are considerably harder to implement across companies than within companies, the pencil as a design tool will not be eliminated during the next five years.
- Because AEC is built primarily on a "one design/one build" model, proven economic benefits of CAD use will remain smaller than in mechanical and electronic applica- tions, where automated quantity manufacture can more readily leverage improved designs. This fact both discourages CAD use and drives users to focus on electronic drafting. Drafting software is nearly a commodity typically sold on PCs and commands a rela- tively low price.

GIS/Mapping

GIS software revenue is forecast to grow at a robust 19 percent CAGR during the next five years, primarily because of the following factors:

- Bread-and-butter prospects in government and utilities are charged with maintaining information on land and assets in per- petuity. Many of these prospective buyers are still using paper maps, which will degrade. This creates a certain inevitability to moving from paper maps to computer maps—the first step to building a GIS.
- Inexpensive spatial data—both public and private—are accumulating, and their reuse will help dissolve a traditional obstacle to growth in GIS.

- Several new technologies will drive growth in the GIS market. Currently, advances in global positioning systems (GPS) and aerial photography are making it possible to create GIS systems significantly more accurate than existing paper maps, giving experienced users some compelling reasons to reinvest. Increasingly portable computers, multimedia, and better compression of satel- lite imagery will create opportunities to develop more useful GIS.
- Opportunities for growth exist in new appli- cations, industries, and regions. During the forecast period, slow sales in one area will generally be balanced with higher sales in another.

Two factors seriously threaten the long-term expansion of the GIS market, as follows:

- The uncertain (but certainly high) cost of creating a working GIS.
- The impact of applications stuck in the pilot phase, both in terms of halted purchases at the troubled project, and the negative pub- licity these projects create.

Electronic Design Automation

The electronic design automation (EDA) indus- try produced a lackluster 1 percent growth in total factory revenue in 1991 and a 5 percent growth in software revenue. This has as much to do with fundamental changes occurring within the top suppliers as with the following economic factors:

- Product transitions of top EDA suppliers have caused a significant stagnation in the purchase of new EDA tools. Buyers are prolonging their evaluation process. This problem is further exacerbated by the global recession and political and economic infra- structure changes in North America and Europe.
- The final vestiges of platform dependence are being removed from the EDA industry. This has had a short-term negative effect on the market, but should improve the profitability of EDA tool suppliers.

Fueling the fires of growth in the coming years will be the ever-increasing demands to shorten the design cycles of electronic systems.

EDA tools will continue to be purchased in hopes to gain competitive advantages. Application markets that will contribute to this growth include the following:

- Advanced analysis tools for IC and PCB designs. Increasing clock frequencies will require tighter design tolerances and sophisticated analysis tools will be needed to ensure proper operation.
- Architectural-level tools to improve designer productivity. While top-down design is now being adopted by the majority of electronic designers, architectural-level tools will emerge during the next two to five years.
- Emerging higher service content. A higher service content will emerge in the EDA industry as large suppliers shift their business models toward solutions and selling integration services.

Notes on Forecast

For the 1991 publishing cycle, Dataquest's CAD/CAM/CAE/GIS group added server as a platform. The platform categories now include technical workstation, host-dependent, server, and personal computer. Revenue formerly classified in technical workstations, host-dependent, or personal computer may now be more accurately classified, where appropriate, in the server category. However, because of this reclassification, data and growth rates for the other platform areas were affected. Figure 4 depicts the revised platform distribution.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is an underlying philosophy that says the best data and analyses come from a well-balanced program. This program includes the following: balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry

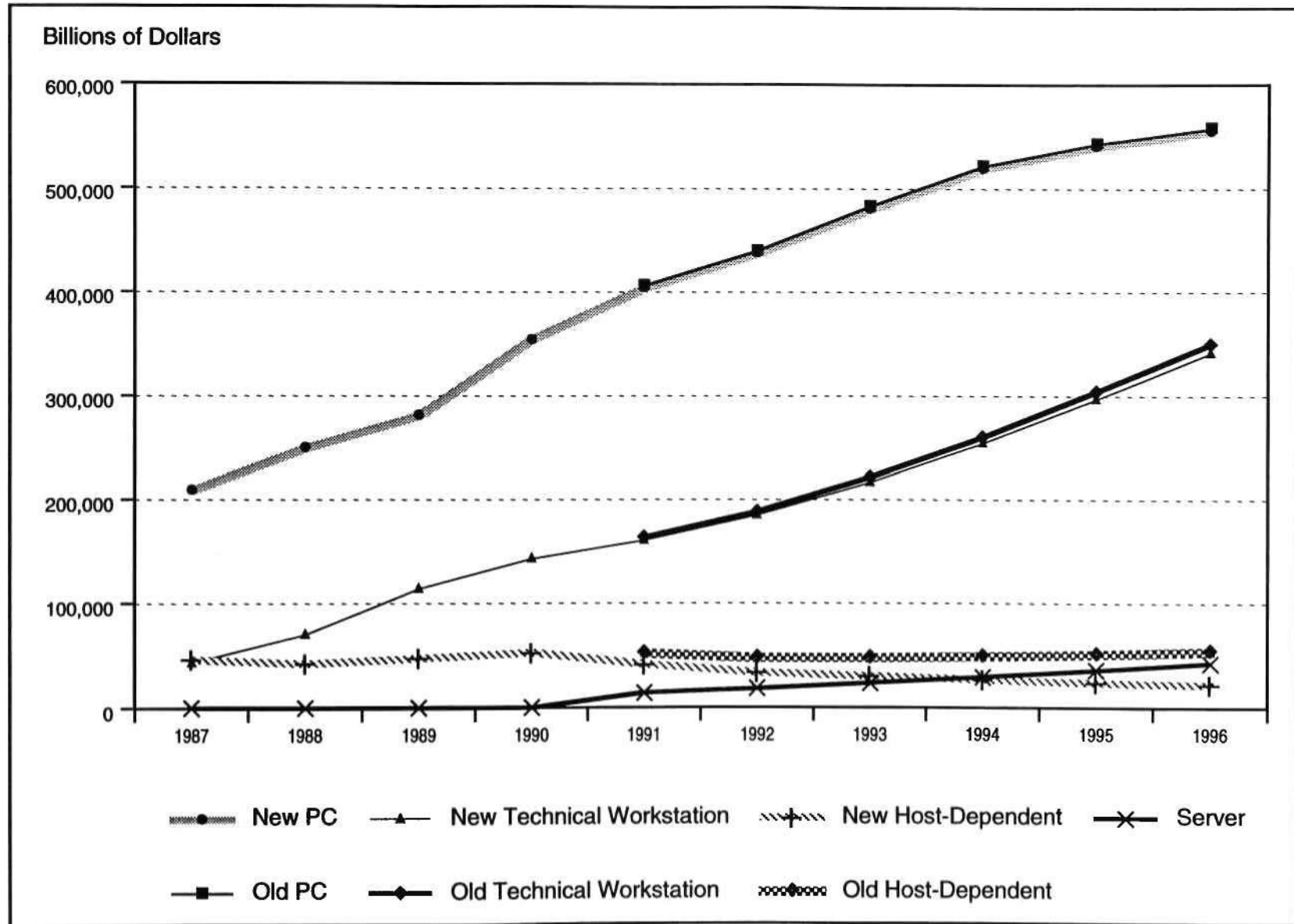
professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macroenvironment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at GNP growth, interest rate fluctuation, currency fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1992. Figure 5 depicts the building blocks for the CAD/CAM/CAE/GIS forecast.

Figure 6 is a diagram of the CAD/CAM/CAE/GIS forecasting model. The overall forecasting process uses a combination of forecasting techniques such as time series and technological modeling. Market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE/GIS group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by channel, product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market (TAM) model and a satisfied available market figure to accurately assess the levels of penetration. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Figure 7 shows the CAD/CAM/CAE/GIS installed base by platform. In addition, Dataquest analysts factor in the acceptance or ability for users to consume new technology.

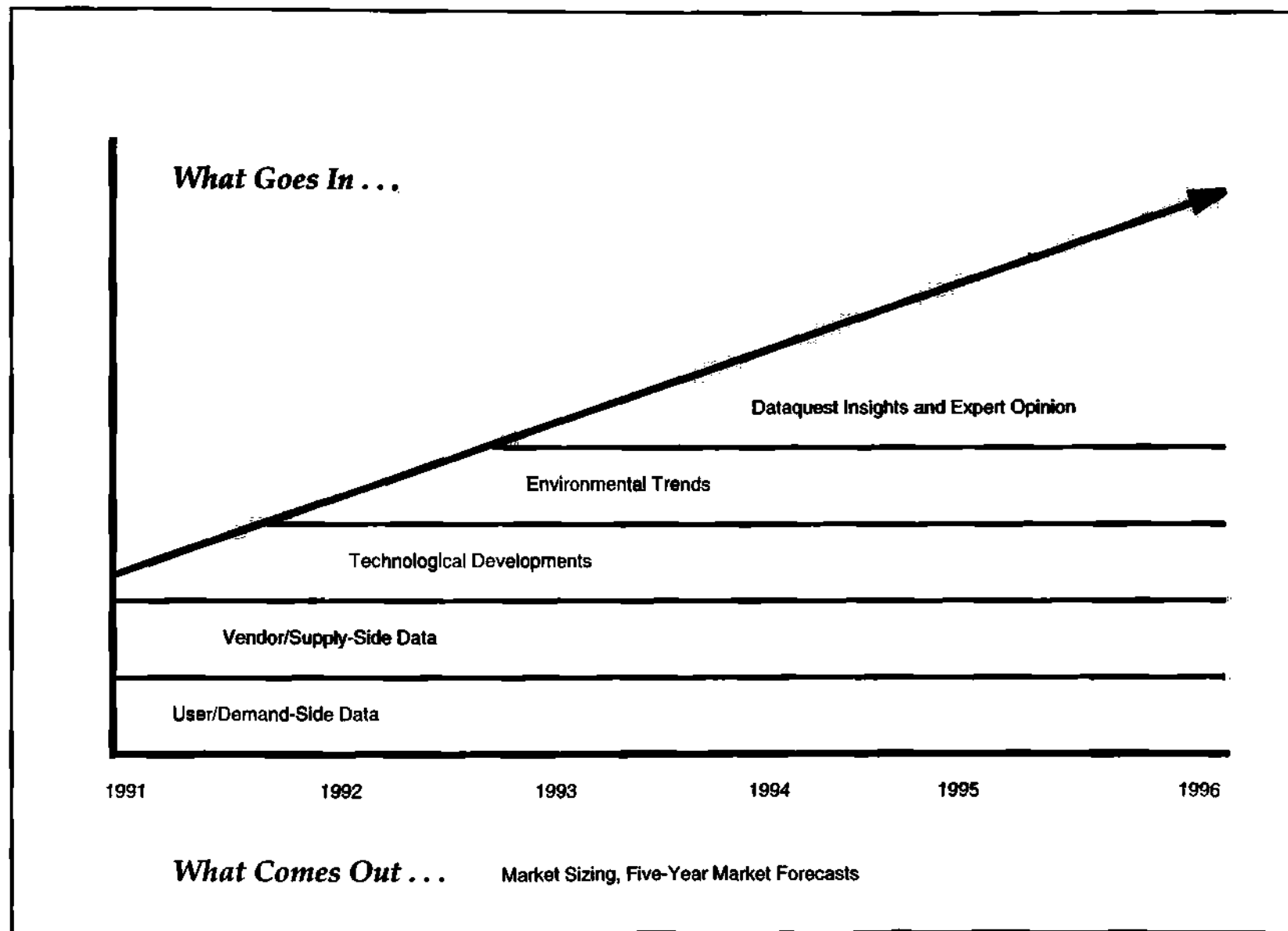
Figure 4
CAD/CAM/CAE/GIS Revised Platform Distribution



Source: Dataquest (October 1992)

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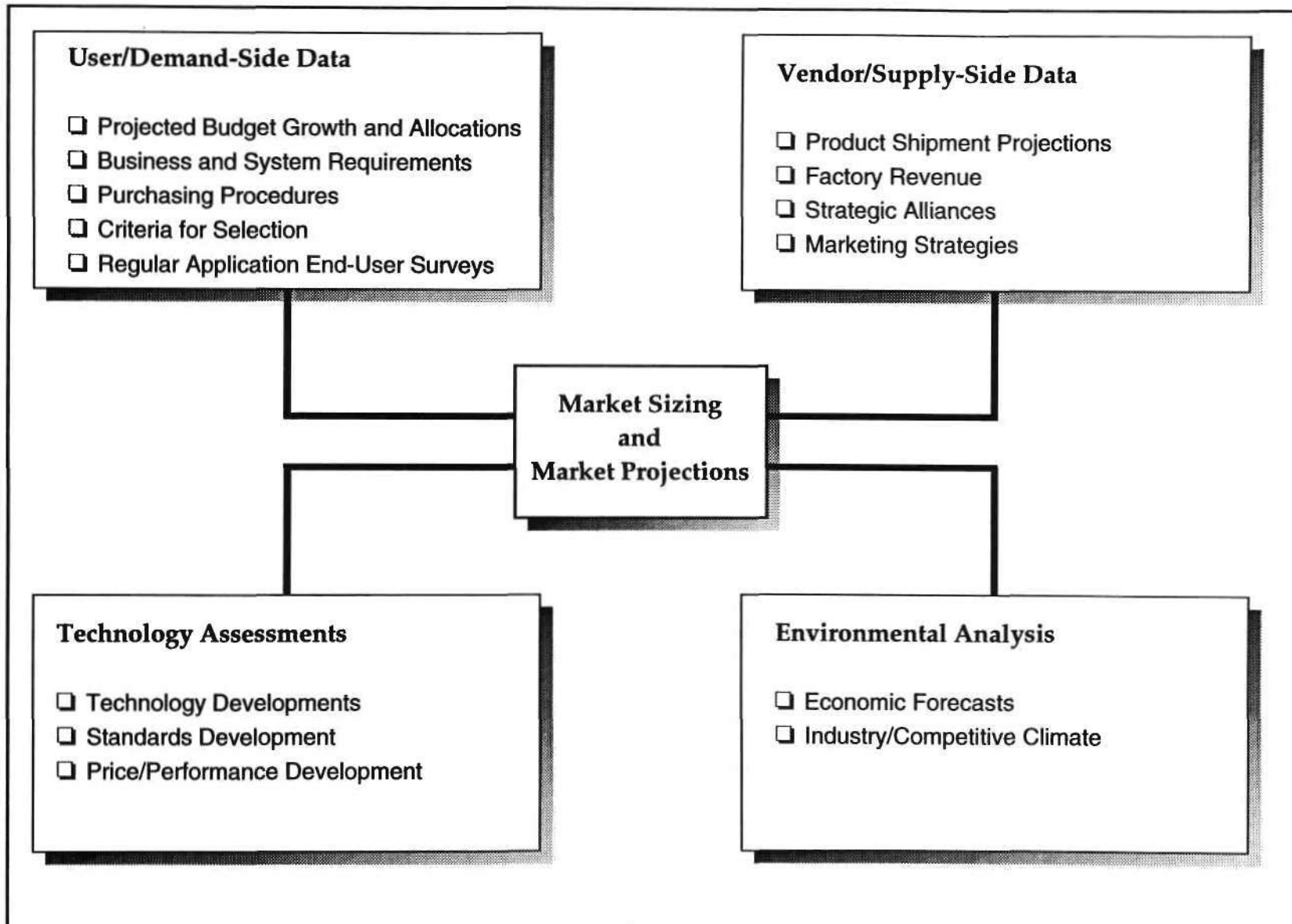
Figure 5
Dataquest's Building Blocks for CAD/CAM/CAE/GIS Market Forecasting



Source: Dataquest (October 1992)

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Figure 6
CAD/CAM/CAE/GIS Market Forecasting Model

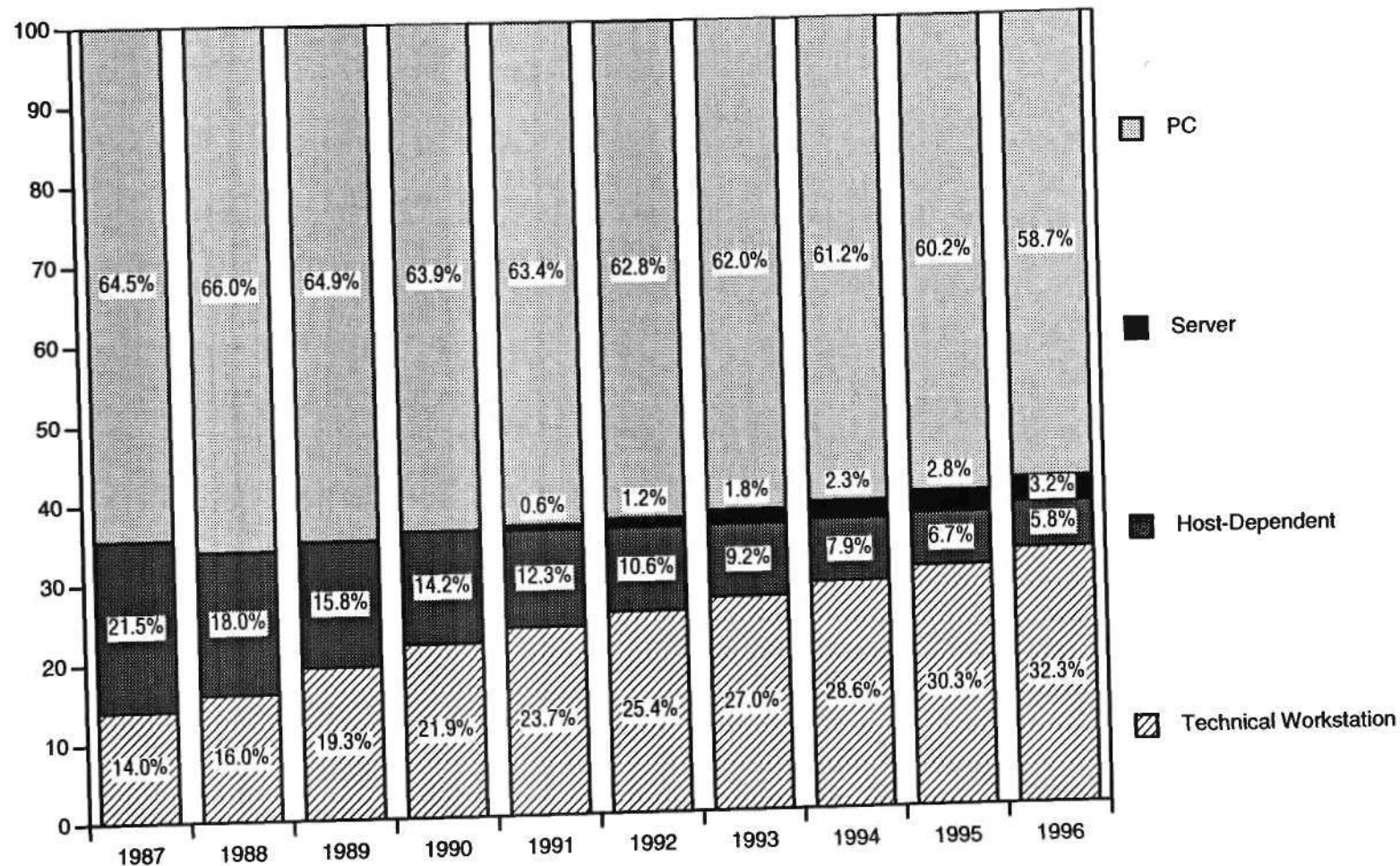


Source: Dataquest (October 1992)

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Figure 7
CAD/CAM/CAE/GIS Installed Base

Percentage



Note: Segments may not add up to 100 percent because of rounding.

G2001771

Source: Dataquest (October 1992)

- **Capacity-based analysis**—This method involves identifying future shipment volume constraints. These constraints, or “ceilings,” can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

Segmentation

Dataquest defines CAD/CAM/CAE/GIS as systems used in the mechanical; architecture, engineering, and construction (AEC); GIS/mapping; and EDA application areas. The CAD/CAM/CAE/GIS market is defined according to the following segmentation scheme:

- **CAD/CAM/CAE/GIS**
 - Mechanical
 - AEC
 - GIS/Mapping
 - EDA
 - Electronic CAE
 - IC Layout
 - PCB/Hybrid/MCM

In addition, more detailed information by subapplication is available and usually published in *Dataquest Perspectives*.

Definitions

This section lists the definitions that are specific to this document.

Application definitions are as follows:

- **Mechanical**—This segment refers to computer-aided tools used to design, analyze, document, and manufacture discrete parts, components, and assemblies.
- **Architecture, Engineering, and Construction (AEC)**—This segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.

- **Geographic Information Systems (GIS)/Mapping**—This is a computer-based technology, composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.
- **Electronic Design Automation (EDA)**—This segment covers computer-based tools that are used to automate the process of designing an electronic product including printed circuit boards, ICs, and systems. EDA includes ECAD, IC Layout, and PCB/Hybrid/MCM, as follows:
 - **Electronic Computer-Aided Engineering (CAE)**—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of electronic CAE applications are schematic capture and simulation.
 - **IC Layout**—This is a software application tool that is used to create and validate the physical implementation of an integrated circuit (IC). The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
 - **Printed Circuit Board (PCB)/Hybrid/Multichip Module (MCM)**—This segment covers products that are used to create the placement and routing of the traces and components laid out on a printed circuit board. Also, included in this category are thermal analysis tools.

Regional definitions are as follows:

- **North America**—Includes United States and Canada
- **Europe**—Includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe
- **Asia**—Includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong
- **Rest of World**—All other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East

Platform definitions are as follows:

- **Technical Workstation**—A single-user computer that is distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, Domain); the computer is designed by the manufacturer to run high-performance graphic applications in a multiuser/multitasking environment.
- **Host-Dependent**—A shared logic system in which the external workstations' functions are dependent on a host computer.
- **Server**—A computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, compute capability, and others. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:
 - **Compute Servers**—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
 - **Print Servers**—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.
 - **File Servers**—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
 - **Database Servers**—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.
- **Personal Computer**—A single-user computer that is distinguished from a technical workstation by its features and by the

user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Line item definitions are as follows:

- **Average selling price (ASP)** is defined as the average price of a product, inclusive of any discounts.
- **CPU installed base** is defined as the total number of CPUs in active, day-to-day use.
- **CPU revenue** is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
- **CPU shipment** is defined as the number of CPUs delivered.
- **Hardware revenue** is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
- **Installed seats** are defined as the total number of seats in active, day-to-day use.
- **Peripherals revenue** is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
- **Service revenue** is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
- **Software revenue** is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- **Terminal revenue** is defined as revenue derived from the sale of terminals that are used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
- **Total factory revenue** is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars.

Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue).

- Unit shipment is defined as the number of products delivered (that is, seats).

Table 3
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Worldwide
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	53,963	75,617	94,903	108,520	124,339	136,690	153,060	168,620	177,960	191,270	23	9
Unit Shipments or Seats	57,285	77,775	97,681	111,042	126,853	138,840	154,860	170,000	178,990	191,980	22	9
CPU Installed Base	128,377	196,533	275,822	356,145	438,490	518,020	599,440	680,020	752,760	824,070	36	13
Installed Seats	138,617	208,378	289,647	371,325	454,611	534,290	615,430	695,400	767,080	837,040	35	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	60.5	63.1	53.3	50.8	44.9	43.6	44.4	46.0	48.4	49.7	-7	2
Hardware-Only ASP	14.3	12.9	12.7	12.2	10.5	9.8	9.5	9.5	9.9	10.2	-7	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,098	1,402	1,598	1,665	1,600	1,591	1,673	1,809	1,968	2,155	10	6
CPU Revenue	737	1,069	1,335	1,431	1,349	1,361	1,456	1,593	1,752	1,941	16	8
Terminal Revenue	137	61	73	68	65	56	49	40	32	24	-17	-18
Peripheral Revenue (Turnkey)	224	272	190	167	187	174	169	176	184	190	-4	0
Software Revenue	828	912	1,073	1,166	1,210	1,244	1,325	1,478	1,646	1,812	10	8
Bundled	304	343	455	397	299	252	226	220	218	218	-0	-6
Unbundled	524	569	618	769	911	992	1,099	1,258	1,428	1,593	15	12
Service Revenue	285	388	457	566	616	672	773	895	1,035	1,187	21	14
Total Factory Revenue	2,211	2,702	3,128	3,397	3,427	3,507	3,771	4,182	4,648	5,154	12	9
Increase over Prior Year (%)	18	22	16	9	1	2	8	11	11	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 4
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Worldwide
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	15,402	26,493	43,214	48,184	52,982	64,510	79,970	97,860	118,380	140,560	36	22
Unit Shipments or Seats	15,402	26,493	43,214	48,184	52,982	64,510	79,970	97,860	118,380	140,560	36	22
CPU Installed Base	40,538	64,493	103,211	143,319	183,984	230,120	284,710	348,570	422,560	510,240	46	23
Installed Seats	40,538	64,493	103,211	143,319	183,984	230,120	284,710	348,570	422,560	510,240	46	23
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	68.4	62.8	57.1	55.0	56.2	54.5	52.4	51.6	51.3	50.2	-5	-2
Hardware-Only ASP	23.7	19.4	14.7	15.6	12.8	11.6	10.7	10.1	9.8	9.5	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	493	737	910	986	902	939	1,029	1,160	1,328	1,503	16	11
CPU Revenue	360	550	785	866	778	824	917	1,042	1,202	1,372	21	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	133	187	126	119	124	115	112	118	126	131	-2	1
Software Revenue	551	657	821	891	936	975	1,054	1,203	1,368	1,533	14	10
Bundled	246	291	410	349	244	207	188	186	187	190	-0	-5
Unbundled	305	366	411	542	692	769	866	1,018	1,181	1,343	23	14
Service Revenue	177	252	318	428	458	516	604	710	832	962	27	16
Total Factory Revenue	1,221	1,646	2,050	2,306	2,296	2,430	2,687	3,074	3,528	3,998	17	12
Increase over Prior Year (%)	41	35	25	12	-0	6	11	14	15	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 5
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Worldwide
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	848	2,063	4,903	4,822	1,802	1,480	1,340	1,190	1,030	870	21	-14
Unit Shipments or Seats	4,170	4,220	7,682	7,344	4,316	3,620	3,130	2,570	2,060	1,570	1	-18
CPU Installed Base	4,682	6,462	10,936	15,100	16,079	16,470	16,370	15,500	13,900	12,190	36	-5
Installed Seats	14,922	18,307	24,760	30,280	32,199	32,740	32,360	30,880	28,210	25,160	21	-5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	279.0	331.1	326.4	124.2	102.8	93.5	90.0	79.7	67.9	57.7	-22	-11
Hardware-Only ASP	2,208.5	172.6	71.8	75.4	164.0	158.1	145.3	132.5	120.6	109.2	-48	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	417	400	410	371	235	184	158	129	103	79	-13	-20
CPU Revenue	200	274	291	277	155	117	100	82	65	51	-6	-20
Terminal Revenue	137	61	73	68	65	56	49	40	32	24	-17	-18
Peripheral Revenue (Turnkey)	80	66	46	26	14	11	9	7	6	4	-35	-22
Software Revenue	113	102	81	80	40	27	20	15	11	8	-23	-27
Bundled	41	41	27	28	21	16	12	9	6	4	-16	-27
Unbundled	72	61	54	52	19	12	8	6	5	4	-28	-26
Service Revenue	86	112	108	104	71	58	51	42	34	27	-5	-18
Total Factory Revenue	617	614	599	555	345	269	229	187	148	114	-13	-20
Increase over Prior Year (%)	-1	-0	-3	-7	-38	-22	-15	-19	-21	-23		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 6
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Worldwide
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	4,687	6,440	8,950	12,190	15,840	19,720	NA	33
Unit Shipments or Seats	NA	NA	NA	NA	4,687	6,440	8,950	12,190	15,840	19,720	NA	33
CPU Installed Base	NA	NA	NA	NA	4,687	10,850	19,080	29,300	41,910	55,510	NA	64
Installed Seats	NA	NA	NA	NA	4,687	10,850	19,080	29,300	41,910	55,510	NA	64
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	90.9	85.6	80.7	76.5	72.7	69.1	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	30.7	27.5	25.4	24.2	23.5	23.2	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	155	189	241	311	390	475	NA	25
CPU Revenue	NA	NA	NA	NA	131	163	209	273	346	425	NA	27
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	24	27	32	38	45	50	NA	16
Software Revenue	NA	NA	NA	NA	23	25	30	37	43	49	NA	16
Bundled	NA	NA	NA	NA	12	13	15	18	21	23	NA	14
Unbundled	NA	NA	NA	NA	12	12	15	19	23	27	NA	18
Service Revenue	NA	NA	NA	NA	47	58	76	101	129	161	NA	28
Total Factory Revenue	NA	NA	NA	NA	225	272	347	448	563	685	NA	25
Increase over Prior Year (%)	NA	NA	NA	NA	NA	21	28	29	26	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 7
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Worldwide
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	37,714	47,062	46,786	55,514	64,868	64,260	62,800	57,380	42,700	30,120	15	-14
Unit Shipments or Seats	37,714	47,062	46,786	55,514	64,868	64,260	62,810	57,390	42,710	30,130	15	-14
CPU Installed Base	83,158	125,578	161,675	197,726	233,740	260,580	279,290	286,650	274,390	246,120	29	1
Installed Seats	83,158	125,578	161,675	197,726	233,740	260,580	279,290	286,650	274,390	246,120	29	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.1	14.8	18.2	19.4	13.0	11.9	10.4	9.8	9.2	9.0	4	-7
Hardware-Only ASP	4.7	5.3	5.1	5.0	4.4	4.0	3.7	3.5	3.3	3.2	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	187	265	278	308	309	279	245	209	147	99	13	-20
CPU Revenue	177	245	260	287	285	257	229	196	138	94	13	-20
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	10	20	18	21	24	22	16	12	8	5	24	-28
Software Revenue	165	153	171	195	211	217	220	223	223	221	6	1
Bundled	18	11	19	20	22	16	10	7	4	2	5	-40
Unbundled	146	142	153	175	189	200	210	216	219	219	7	3
Service Revenue	22	24	30	33	40	40	42	42	40	37	16	-2
Total Factory Revenue	374	443	480	537	560	536	507	474	409	356	11	-9
Increase over Prior Year (%)	-3	18	8	12	4	-4	-5	-7	-14	-13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 8
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: North America
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	23,772	38,993	41,947	45,682	53,118	59,230	61,640	64,790	66,530	71,090	22	6
Unit Shipments or Seats	25,243	39,751	42,881	47,002	54,422	60,410	62,570	65,450	66,990	71,390	21	6
CPU Installed Base	69,956	103,811	136,016	165,776	196,974	228,180	256,760	282,070	303,030	323,330	30	10
Installed Seats	75,154	109,271	141,771	172,118	203,812	235,380	264,050	289,210	309,750	329,390	28	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	58.1	66.9	58.2	55.7	51.9	48.8	47.2	46.4	46.1	45.3	-3	-3
Hardware-Only ASP	13.6	11.7	13.0	12.6	10.5	10.0	10.0	10.1	10.7	11.0	-6	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	420	601	650	658	632	650	666	702	755	823	11	5
CPU Revenue	275	470	557	569	548	572	593	633	687	756	19	7
Terminal Revenue	54	19	29	35	34	31	25	18	13	10	-11	-22
Peripheral Revenue (Turnkey)	91	112	65	54	50	47	48	51	55	58	-14	3
Software Revenue	342	391	450	504	489	481	495	549	611	671	9	7
Bundled	81	115	132	125	77	58	53	51	49	50	-1	-8
Unbundled	262	276	318	379	412	422	442	498	561	622	12	9
Service Revenue	125	171	209	260	288	317	364	420	483	549	23	14
Total Factory Revenue	888	1,162	1,309	1,422	1,409	1,448	1,526	1,671	1,849	2,043	12	8
Increase over Prior Year (%)	-1	31	13	9	-1	3	5	10	11	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 9
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: North America
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,004	12,238	19,107	21,232	23,594	29,630	35,470	41,460	48,650	56,770	35	19
Unit Shipments or Seats	7,004	12,238	19,107	21,232	23,594	29,630	35,470	41,460	48,650	56,770	35	19
CPU Installed Base	22,324	32,885	49,177	65,862	83,114	103,930	127,850	153,840	182,590	215,760	39	21
Installed Seats	22,324	32,885	49,177	65,862	83,114	103,930	127,850	153,840	182,590	215,760	39	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.2	58.8	54.8	53.2	48.2	46.0	44.2	42.8	41.8	40.8	-1	-3
Hardware-Only ASP	22.9	19.6	15.1	15.0	12.2	11.0	10.2	9.5	9.2	8.9	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	182	304	361	377	339	367	394	427	476	532	17	9
CPU Revenue	132	228	322	340	313	343	372	404	452	508	24	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	50	76	39	37	26	23	23	23	24	25	-15	-1
Software Revenue	219	275	335	386	379	381	404	464	530	594	15	9
Bundled	68	107	128	119	66	50	44	40	37	36	-1	-11
Unbundled	150	168	208	267	313	331	361	424	492	558	20	12
Service Revenue	76	110	147	199	217	247	290	337	391	448	30	16
Total Factory Revenue	477	688	843	962	936	995	1,089	1,228	1,396	1,574	18	11
Increase over Prior Year (%)	18	44	23	14	-3	6	9	13	14	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 10
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: North America
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	358	1,014	2,608	2,187	589	500	440	360	310	250	13	-16
Unit Shipments or Seats	1,828	1,771	3,542	3,508	1,892	1,680	1,380	1,020	770	550	1	-22
CPU Installed Base	2,492	3,283	5,598	7,409	7,557	7,490	7,200	6,560	5,580	4,660	32	-9
Installed Seats	7,690	8,744	11,354	13,750	14,395	14,680	14,490	13,690	12,300	10,720	17	-6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	179.5	211.9	191.5	217.9	292.3	256.6	229.3	178.9	169.4	164.6	13	-11
Hardware-Only ASP	3,998.6	166.7	65.5	74.3	171.4	164.4	150.9	136.8	122.9	110.7	-54	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	166	173	185	169	101	83	67	49	38	28	-12	-23
CPU Revenue	73	119	134	123	63	49	39	29	23	17	-4	-23
Terminal Revenue	54	19	29	35	34	31	25	18	13	10	-11	-22
Peripheral Revenue (Turnkey)	39	35	22	11	5	3	3	2	2	1	-41	-25
Software Revenue	47	37	37	33	14	7	4	2	1	1	-27	-48
Bundled	8	6	3	6	4	1	1	0	0	0	-17	-57
Unbundled	39	31	34	27	10	6	3	2	1	0	-29	-46
Service Revenue	41	49	51	49	32	26	20	15	12	9	-6	-23
Total Factory Revenue	254	260	274	252	147	115	91	66	50	37	-13	-24
Increase over Prior Year (%)	-15	3	5	-8	-42	-22	-21	-27	-24	-27		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 11
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: North America
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	2,632	3,710	5,200	7,190	9,250	11,280	NA	34
Unit Shipments or Seats	NA	NA	NA	NA	2,632	3,710	5,200	7,190	9,250	11,280	NA	34
CPU Installed Base	NA	NA	NA	NA	2,632	6,190	10,980	17,040	24,430	32,170	NA	65
Installed Seats	NA	NA	NA	NA	2,632	6,190	10,980	17,040	24,430	32,170	NA	65
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	86.0	81.1	76.6	73.2	69.9	66.7	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	27.9	25.4	23.7	22.7	22.1	21.5	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	80	101	131	173	215	254	NA	26
CPU Revenue	NA	NA	NA	NA	66	85	112	149	187	223	NA	28
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	14	16	19	24	28	31	NA	17
Software Revenue	NA	NA	NA	NA	10	11	14	17	20	23	NA	17
Bundled	NA	NA	NA	NA	6	7	8	10	12	13	NA	16
Unbundled	NA	NA	NA	NA	4	4	5	7	8	9	NA	18
Service Revenue	NA	NA	NA	NA	24	31	42	56	71	85	NA	28
Total Factory Revenue	NA	NA	NA	NA	115	144	187	246	306	362	NA	26
Increase over Prior Year (%)	NA	NA	NA	NA	NA	25	30	32	24	18		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 12
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: North America
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	16,411	25,742	20,232	22,262	26,304	25,380	20,520	15,790	8,320	2,800	13	-36
Unit Shipments or Seats	16,411	25,742	20,232	22,262	26,304	25,380	20,520	15,790	8,320	2,800	13	-36
CPU Installed Base	45,141	67,642	81,240	92,505	103,671	110,570	110,730	104,630	90,430	70,730	23	-7
Installed Seats	45,141	67,642	81,240	92,505	103,671	110,570	110,730	104,630	90,430	70,730	23	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	20.4	98.7	28.3	24.7	22.6	16.9	14.4	12.9	9.9	9.5	3	-16
Hardware-Only ASP	4.2	4.6	5.1	4.9	4.2	3.9	3.5	3.3	3.2	3.0	0	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	72	124	104	111	111	99	74	53	27	9	11	-40
CPU Revenue	71	123	101	106	106	95	70	51	25	8	11	-40
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	1	3	5	5	4	3	3	1	1	34	-33
Software Revenue	77	79	77	86	86	81	73	66	60	54	3	-9
Bundled	4	3	1	0	0	0	0	0	0	0	-45	-23
Unbundled	72	76	77	86	85	81	73	66	60	54	4	-9
Service Revenue	8	12	11	12	14	14	12	11	9	7	15	-12
Total Factory Revenue	157	214	192	209	211	194	159	131	96	71	8	-20
Increase over Prior Year (%)	-19	36	-10	9	1	-8	-18	-18	-26	-27		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 13
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Europe
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	18,758	22,795	32,254	36,333	41,922	44,100	51,420	55,920	54,900	54,980	22	6
Unit Shipments or Seats	19,483	23,471	33,237	37,001	42,616	44,610	51,860	56,250	55,110	55,110	22	5
CPU Installed Base	35,085	56,496	85,266	114,069	143,767	169,940	197,850	224,520	243,960	258,710	42	12
Installed Seats	36,939	59,031	88,756	118,109	148,226	174,440	202,270	228,730	247,790	262,110	42	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	37.9	44.5	51.9	52.1	44.8	40.4	41.1	40.3	41.7	43.9	4	-0
Hardware-Only ASP	12.4	15.1	12.7	11.9	10.0	8.9	8.4	8.5	9.3	10.4	-5	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	300	436	515	525	481	445	475	510	542	600	13	5
CPU Revenue	214	362	444	465	422	393	427	463	499	559	19	6
Terminal Revenue	29	13	28	22	20	16	15	13	10	7	-9	-19
Peripheral Revenue (Turnkey)	57	61	43	39	38	36	34	34	33	33	-9	-3
Software Revenue	278	257	283	309	306	315	337	368	396	427	2	7
Bundled	82	81	116	103	69	60	52	47	43	42	-4	-10
Unbundled	195	176	168	206	237	255	286	320	353	385	5	10
Service Revenue	91	125	156	192	199	205	234	266	302	347	22	12
Total Factory Revenue	668	819	954	1,027	985	965	1,047	1,144	1,240	1,374	10	7
Increase over Prior Year (%)	41	23	17	8	-4	-2	8	9	8	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 14
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Europe
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,724	8,302	13,275	13,758	14,923	16,050	20,330	25,460	31,940	39,650	33	22
Unit Shipments or Seats	4,724	8,302	13,275	13,758	14,923	16,050	20,330	25,460	31,940	39,650	33	22
CPU Installed Base	10,416	18,192	30,528	42,192	53,796	64,450	77,220	92,800	112,070	137,400	51	21
Installed Seats	10,416	18,192	30,528	42,192	53,796	64,450	77,220	92,800	112,070	137,400	51	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	56.6	54.1	58.0	54.3	53.4	51.1	49.0	47.6	46.4	45.4	-1	-3
Hardware-Only ASP	24.0	19.8	14.6	16.2	13.1	11.8	10.9	10.3	9.9	9.6	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	138	227	274	283	235	221	248	286	339	404	14	11
CPU Revenue	101	182	251	261	218	205	232	269	322	387	21	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	37	44	23	21	17	16	16	16	17	18	-17	1
Software Revenue	191	188	212	232	226	224	231	249	268	293	4	5
Bundled	73	71	107	94	60	49	41	39	36	36	-5	-10
Unbundled	118	117	105	138	166	174	190	210	232	257	9	9
Service Revenue	57	79	110	146	145	154	176	203	233	270	26	13
Total Factory Revenue	386	494	596	661	606	598	655	737	841	967	12	10
Increase over Prior Year (%)	45	28	21	11	-8	-1	9	13	14	15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 15
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Europe
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	95	540	1,541	1,360	493	370	360	350	290	250	51	-13
Unit Shipments or Seats	820	1,216	2,523	2,027	1,187	900	820	700	530	380	10	-20
CPU Installed Base	630	1,140	2,631	3,884	4,270	4,460	4,490	4,300	3,840	3,370	61	-5
Installed Seats	2,484	3,675	6,120	7,925	8,729	8,960	8,920	8,510	7,670	6,770	37	-5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	431.5	262.4	325.1	314.6	371.7	337.9	316.9	295.7	248.1	142.3	-4	-17
Hardware-Only ASP	2,979.5	231.2	84.2	83.7	149.5	143.7	132.2	121.4	110.9	101.2	-53	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	92	123	142	122	78	56	51	44	33	25	-4	-20
CPU Revenue	48	96	101	94	53	37	34	29	22	16	3	-21
Terminal Revenue	29	13	28	22	20	16	15	13	10	7	-9	-19
Peripheral Revenue (Turnkey)	15	13	12	7	4	3	3	2	2	1	-27	-23
Software Revenue	30	20	15	16	9	8	7	5	3	2	-26	-25
Bundled	5	6	4	6	5	5	4	3	1	0	2	-43
Unbundled	26	14	10	10	4	3	3	2	2	2	-37	-14
Service Revenue	24	37	36	36	26	21	19	17	13	10	2	-18
Total Factory Revenue	147	180	193	174	113	85	77	65	49	37	-6	-20
Increase over Prior Year (%)	50	23	7	-9	-35	-25	-9	-15	-24	-25		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 16

CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Europe
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	1,161	1,400	1,910	2,570	3,530	4,770	NA	33
Unit Shipments or Seats	NA	NA	NA	NA	1,161	1,400	1,910	2,570	3,530	4,770	NA	33
CPU Installed Base	NA	NA	NA	NA	1,161	2,490	4,240	6,360	9,170	12,560	NA	61
Installed Seats	NA	NA	NA	NA	1,161	2,490	4,240	6,360	9,170	12,560	NA	61
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	75.0	72.3	69.9	67.2	64.4	62.0	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	38.1	33.9	30.9	29.1	28.2	27.9	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	45	49	61	77	102	136	NA	25
CPU Revenue	NA	NA	NA	NA	40	44	54	69	92	123	NA	25
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	5	5	7	8	10	12	NA	21
Software Revenue	NA	NA	NA	NA	3	4	5	6	8	9	NA	21
Bundled	NA	NA	NA	NA	2	2	3	4	4	5	NA	21
Unbundled	NA	NA	NA	NA	1	1	2	2	3	4	NA	22
Service Revenue	NA	NA	NA	NA	15	16	21	27	36	49	NA	26
Total Factory Revenue	NA	NA	NA	NA	64	69	87	110	145	193	NA	25
Increase over Prior Year (%)	NA	NA	NA	NA	NA	9	26	27	32	33		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 17
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Europe
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	13,939	13,953	17,438	21,216	25,345	26,280	28,820	27,540	19,140	10,320	16	-16
Unit Shipments or Seats	13,939	13,953	17,438	21,216	25,345	26,250	28,790	27,510	19,120	10,310	16	-16
CPU Installed Base	24,039	37,164	52,108	67,993	84,540	98,540	111,890	121,070	118,880	105,380	37	5
Installed Seats	24,039	37,164	52,108	67,993	84,540	98,540	111,890	121,070	118,880	105,380	37	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	7.7	10.8	14.6	21.0	12.4	12.7	11.0	10.3	9.8	9.4	13	-5
Hardware-Only ASP	4.7	5.9	5.3	5.2	4.6	4.2	3.9	3.6	3.5	3.3	-1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	70	87	99	121	123	118	115	103	68	35	15	-22
CPU Revenue	65	84	92	110	111	106	107	96	63	33	14	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	5	3	7	11	12	12	8	7	4	2	28	-29
Software Revenue	56	49	56	61	68	80	95	107	117	123	5	13
Bundled	5	5	4	3	2	4	3	3	2	1	-16	-21
Unbundled	51	44	53	58	65	76	91	105	116	122	6	13
Service Revenue	10	9	10	10	13	15	18	20	20	19	7	8
Total Factory Revenue	135	144	165	192	203	213	228	231	205	176	11	-3
Increase over Prior Year (%)	22	7	15	16	6	5	7	1	-11	-14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 18
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Asia
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	10,444	13,029	19,067	24,285	26,348	29,490	34,210	39,540	45,020	50,050	26	14
Unit Shipments or Seats	11,494	13,686	19,836	24,698	26,741	29,830	34,510	39,800	45,260	50,260	24	13
CPU Installed Base	21,097	33,294	50,206	70,185	89,340	108,620	129,030	151,040	174,330	198,910	43	17
Installed Seats	24,079	36,892	54,455	74,555	93,645	112,610	132,650	154,330	177,300	201,640	40	17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	98.5	84.2	51.5	47.7	42.4	43.1	44.6	48.1	51.9	53.5	-19	5
Hardware-Only ASP	18.9	12.8	12.1	11.7	11.7	11.3	10.8	10.7	10.6	10.5	-11	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	356	347	413	456	460	466	492	546	606	654	7	7
CPU Revenue	232	222	318	374	356	370	401	451	506	553	11	9
Terminal Revenue	51	26	14	8	8	6	6	6	6	5	-38	-7
Peripheral Revenue (Turnkey)	73	99	81	73	97	89	85	89	94	96	7	-0
Software Revenue	203	258	335	345	407	438	478	546	616	685	19	11
Bundled	140	145	207	168	153	132	121	120	124	126	2	-4
Unbundled	63	113	128	177	255	305	358	425	493	559	42	17
Service Revenue	66	88	87	108	124	143	165	197	233	270	17	17
Total Factory Revenue	625	693	835	909	992	1,046	1,135	1,289	1,455	1,608	12	10
Increase over Prior Year (%)	37	11	20	9	9	5	8	14	13	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 19
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Asia
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,469	5,666	10,457	12,582	13,775	17,890	22,880	29,170	35,410	41,000	41	24
Unit Shipments or Seats	3,469	5,666	10,457	12,582	13,775	17,890	22,880	29,170	35,410	41,000	41	24
CPU Installed Base	7,000	12,370	22,164	33,456	44,769	58,810	75,720	96,660	120,770	147,560	59	27
Installed Seats	7,000	12,370	22,164	33,456	44,769	58,810	75,720	96,660	120,770	147,560	59	27
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	110.8	78.9	58.3	56.9	62.8	60.7	57.8	56.9	56.7	55.3	-13	-3
Hardware-Only ASP	25.2	17.6	14.3	16.1	14.1	12.7	11.7	11.0	10.6	10.3	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	168	201	271	317	320	342	375	433	493	540	18	11
CPU Revenue	122	135	208	257	240	267	303	355	410	454	18	14
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	45	65	62	60	80	75	72	77	83	86	15	1
Software Revenue	139	191	271	271	328	366	411	483	557	628	24	14
Bundled	103	112	174	136	118	107	102	107	113	117	3	-0
Unbundled	36	79	96	135	210	259	309	376	444	511	55	19
Service Revenue	42	62	60	82	94	113	133	164	199	234	22	20
Total Factory Revenue	349	453	601	669	742	820	920	1,080	1,249	1,402	21	14
Increase over Prior Year (%)	91	30	33	11	11	11	12	17	16	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 20
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Asia
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	384	492	686	1,185	683	570	490	430	370	330	15	-14
Unit Shipments or Seats	1,435	1,149	1,456	1,598	1,076	880	750	660	580	520	-7	-14
CPU Installed Base	1,439	1,905	2,511	3,538	3,964	4,230	4,360	4,320	4,150	3,830	29	-1
Installed Seats	4,420	5,502	6,760	7,907	8,269	8,230	7,980	7,610	7,120	6,570	17	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	344.7	518.2	485.3	88.4	72.7	68.3	63.9	60.1	56.6	53.3	-32	-6
Hardware-Only ASP	1,074.5	91.1	60.5	56.3	177.2	165.6	153.2	141.2	130.1	120.2	-36	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	146	95	73	69	48	38	33	28	24	21	-24	-15
CPU Revenue	72	51	49	54	35	27	23	20	17	14	-16	-17
Terminal Revenue	51	26	14	8	8	6	6	6	6	5	-38	-7
Peripheral Revenue (Turnkey)	24	17	11	7	5	4	3	3	2	2	-32	-20
Software Revenue	35	44	29	30	17	12	10	8	6	5	-17	-20
Bundled	28	30	19	16	12	10	7	6	5	4	-19	-21
Unbundled	7	14	10	15	5	3	2	2	2	2	-8	-18
Service Revenue	20	23	18	16	12	10	9	8	7	7	-13	-10
Total Factory Revenue	201	161	121	116	76	60	51	44	38	34	-22	-15
Increase over Prior Year (%)	2	-20	-25	-4	-34	-21	-15	-13	-14	-12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 21
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
Region: Asia
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	798	1,190	1,630	2,140	2,650	3,130	NA	31
Unit Shipments or Seats	NA	NA	NA	NA	798	1,190	1,630	2,140	2,650	3,130	NA	31
CPU Installed Base	NA	NA	NA	NA	798	1,940	3,440	5,230	7,300	9,350	NA	64
Installed Seats	NA	NA	NA	NA	798	1,940	3,440	5,230	7,300	9,350	NA	64
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	122.9	115.3	110.6	105.8	101.0	96.5	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	29.9	27.0	24.8	23.6	22.9	22.4	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	27	36	44	54	65	74	NA	22
CPU Revenue	NA	NA	NA	NA	23	31	39	48	58	67	NA	24
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	5	5	6	6	6	7	NA	7
Software Revenue	NA	NA	NA	NA	9	9	11	14	16	18	NA	13
Bundled	NA	NA	NA	NA	3	4	4	4	4	4	NA	5
Unbundled	NA	NA	NA	NA	6	6	7	10	12	13	NA	17
Service Revenue	NA	NA	NA	NA	6	9	12	15	19	22	NA	28
Total Factory Revenue	NA	NA	NA	NA	43	54	68	83	99	114	NA	21
Increase over Prior Year (%)	NA	NA	NA	NA	NA	25	25	23	19	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 22
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Asia
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	6,590	6,871	7,924	10,518	11,093	9,840	9,210	7,810	6,590	5,590	14	-13
Unit Shipments or Seats	6,590	6,871	7,924	10,518	11,093	9,870	9,240	7,830	6,610	5,610	14	-13
CPU Installed Base	12,659	19,019	25,531	33,191	39,809	43,640	45,510	44,830	42,110	38,160	33	-1
Installed Seats	12,659	19,019	25,531	33,191	39,809	43,640	45,510	44,830	42,110	38,160	33	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	15.1	14.8	19.4	18.7	12.9	11.3	10.0	9.3	8.8	8.6	-4	-8
Hardware-Only ASP	5.8	7.1	4.8	4.5	4.3	3.9	3.6	3.4	3.2	3.1	-7	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	41	52	69	70	65	50	40	30	23	18	12	-22
CPU Revenue	38	35	61	64	58	45	36	28	21	17	12	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	16	7	6	6	5	4	3	2	2	15	-25
Software Revenue	29	23	35	44	53	50	46	42	37	34	16	-9
Bundled	9	4	14	17	19	12	7	4	2	1	22	-46
Unbundled	21	20	21	28	34	38	39	38	35	33	13	-1
Service Revenue	4	4	9	11	13	11	10	9	8	7	34	-11
Total Factory Revenue	75	79	113	125	131	111	96	81	68	59	15	-15
Increase over Prior Year (%)	-3	5	44	10	5	-15	-13	-16	-16	-14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 23
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Rest of World
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	989	800	1,635	2,220	2,950	3,870	5,780	8,370	11,510	15,150	31	39
Unit Shipments or Seats	1,065	866	1,727	2,341	3,074	3,990	5,920	8,510	11,640	15,220	30	38
CPU Installed Base	2,238	2,932	4,335	6,115	8,409	11,280	15,800	22,400	31,450	43,130	39	39
Installed Seats	2,445	3,184	4,665	6,543	8,927	11,860	16,460	23,130	32,240	43,900	38	38
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	49.6	37.2	55.8	50.9	42.8	55.0	55.2	52.2	60.7	58.6	-4	6
Hardware-Only ASP	20.8	21.2	11.0	11.6	8.8	7.6	6.7	6.0	5.5	5.1	-19	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	18	20	27	27	30	40	51	65	79	5	24
CPU Revenue	16	15	16	22	22	26	35	46	59	73	8	27
Terminal Revenue	3	2	2	3	3	3	3	3	3	2	1	-9
Peripheral Revenue (Turnkey)	3	1	1	1	1	1	2	2	3	3	-18	22
Software Revenue	5	6	6	7	8	11	14	15	22	29	14	28
Bundled	1	1	1	1	1	1	1	1	1	1	-15	14
Unbundled	4	5	5	6	8	10	13	15	21	27	22	29
Service Revenue	3	5	4	5	5	7	9	12	16	21	13	32
Total Factory Revenue	30	29	30	39	41	47	63	79	104	129	7	26
Increase over Prior Year (%)	-38	-6	6	29	4	17	33	25	32	24		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 24
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Rest of World
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	205	288	375	612	690	930	1,290	1,780	2,390	3,140	35	35
Unit Shipments or Seats	205	288	375	612	690	930	1,290	1,780	2,390	3,140	35	35
CPU Installed Base	798	1,045	1,342	1,808	2,305	2,930	3,920	5,280	7,130	9,520	30	33
Installed Seats	798	1,045	1,342	1,808	2,305	2,930	3,920	5,280	7,130	9,520	30	33
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.8	28.2	48.0	46.5	57.0	56.0	54.4	53.6	52.5	51.7	2	-2
Hardware-Only ASP	26.8	20.5	7.8	13.6	10.1	9.3	8.6	8.2	7.9	7.7	-22	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	6	6	5	9	7	9	12	15	20	25	6	28
CPU Revenue	5	5	4	8	7	8	11	14	18	23	9	28
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	1	1	1	1	1	1	2	2	-11	25
Software Revenue	2	3	3	3	3	5	7	8	14	18	14	41
Bundled	1	1	1	1	1	1	1	1	1	1	-14	15
Unbundled	1	2	2	2	3	4	7	7	13	17	32	44
Service Revenue	1	2	2	2	2	3	4	6	8	11	13	39
Total Factory Revenue	9	11	9	14	13	17	23	29	42	55	9	33
Increase over Prior Year (%)	-45	16	-14	54	-8	31	38	22	46	31		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 25

CAD/CAM/CAS/CAE History and Forecast Update

Application: Electronic Design Automation

Region: Rest of World

Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	11	17	69	90	37	40	40	50	50	40	35	1
Unit Shipments or Seats	87	83	161	212	161	160	180	190	180	110	17	-7
CPU Installed Base	121	134	196	270	288	290	310	320	340	330	24	3
Installed Seats	328	386	526	698	806	870	970	1,060	1,130	1,100	25	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	330.9	590.0	578.2	251.3	279.1	272.2	277.8	269.0	265.0	258.2	-4	-2
Hardware-Only ASP	1,822.3	527.1	127.4	112.8	196.2	186.8	171.0	155.3	139.9	117.2	-43	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	13	9	9	10	7	7	8	8	8	5	-13	-7
CPU Revenue	8	7	6	7	4	4	4	4	4	3	-15	-6
Terminal Revenue	3	2	2	3	3	3	3	3	3	2	1	-9
Peripheral Revenue (Turnkey)	2	0	1	1	0	0	0	0	0	0	-38	-5
Software Revenue	1	1	0	0	0	0	0	0	0	0	-13	-4
Bundled	0	0	0	0	0	0	0	0	0	0	-14	10
Unbundled	0	1	0	0	0	0	0	0	0	0	-13	-16
Service Revenue	2	3	2	2	2	2	2	2	2	2	4	-2
Total Factory Revenue	15	13	12	13	10	9	10	10	10	7	-10	-6
Increase over Prior Year (%)	-47	-14	-7	11	-28	-9	14	6	-2	-31		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 26
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Rest of World
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	96	140	200	290	410	560	NA	42
Unit Shipments or Seats	NA	NA	NA	NA	96	140	200	290	410	560	NA	42
CPU Installed Base	NA	NA	NA	NA	96	230	420	670	1,010	1,430	NA	72
Installed Seats	NA	NA	NA	NA	96	230	420	670	1,010	1,430	NA	72
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	63.6	59.3	61.0	56.3	55.4	54.4	NA	-3
Hardware-Only ASP	NA	NA	NA	NA	23.7	22.9	21.6	21.1	20.9	20.7	NA	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	2	3	4	6	9	12	NA	38
CPU Revenue	NA	NA	NA	NA	2	3	4	6	8	11	NA	38
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	1	NA	41
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	32
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	32
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	1	1	2	3	4	5	NA	42
Total Factory Revenue	NA	NA	NA	NA	3	5	6	9	12	17	NA	39
Increase over Prior Year (%)	NA	NA	NA	NA	NA	42	39	42	38	35		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 27
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic Design Automation
 Region: Rest of World
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	773	495	1,192	1,518	2,127	2,760	4,250	6,250	8,660	11,410	29	40
Unit Shipments or Seats	773	495	1,192	1,518	2,127	2,760	4,250	6,250	8,660	11,410	29	40
CPU Installed Base	1,319	1,753	2,797	4,037	5,720	7,830	11,160	16,120	22,980	31,850	44	41
Installed Seats	1,319	1,753	2,797	4,037	5,720	7,830	11,160	16,120	22,980	31,850	44	41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	9.3	21.3	25.9	16.1	10.3	7.7	7.3	5.9	8.8	.0	3	-100
Hardware-Only ASP	4.8	6.2	5.2	4.9	4.5	4.1	3.8	3.5	3.3	3.2	-2	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	3	6	7	10	11	16	22	29	37	27	31
CPU Revenue	4	3	6	7	9	11	16	22	29	36	27	31
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	33	15
Software Revenue	2	2	2	4	5	5	6	7	8	10	19	17
Bundled	0	0	0	0	0	0	0	0	0	0	-33	-100
Unbundled	2	2	2	4	5	5	6	7	8	10	22	17
Service Revenue	0	0	0	0	1	1	1	2	3	4	10	49
Total Factory Revenue	6	5	9	12	15	17	23	31	40	51	24	28
Increase over Prior Year (%)	69	-18	78	27	27	17	35	32	28	27		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 28
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Worldwide
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	28,695	39,982	58,960	67,860	74,601	79,560	85,990	88,020	82,030	77,420	27	1
Unit Shipments or Seats	29,802	40,523	59,798	68,563	75,352	80,110	86,470	88,440	82,440	77,780	26	1
CPU Installed Base	81,019	115,400	163,391	213,116	262,514	308,460	351,560	385,600	403,320	408,920	34	9
Installed Seats	83,428	118,319	167,066	217,321	267,194	313,150	356,130	390,050	407,590	412,990	34	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	48.3	49.9	49.7	44.7	38.1	37.6	38.2	39.6	41.9	43.2	-6	3
Hardware-Only ASP	14.8	12.5	10.2	9.9	8.7	8.2	7.9	8.0	8.9	9.7	-12	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	533	675	812	830	764	744	765	787	802	827	9	2
CPU Revenue	351	508	674	719	658	649	669	689	704	727	17	2
Terminal Revenue	47	14	25	22	21	17	16	15	15	14	-18	-8
Peripheral Revenue (Turnkey)	135	152	112	88	84	78	80	82	84	86	-11	0
Software Revenue	396	458	600	654	686	700	752	841	933	1,024	15	8
Bundled	143	157	238	181	131	104	95	90	86	90	-2	-7
Unbundled	253	300	362	473	555	597	657	751	847	934	22	11
Service Revenue	141	192	237	297	315	346	390	443	504	562	22	12
Total Factory Revenue	1,070	1,325	1,650	1,780	1,765	1,790	1,907	2,071	2,239	2,413	13	6
Increase over Prior Year (%)	12	24	25	8	-1	1	6	9	8	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 29
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Worldwide
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	9,254	15,314	22,112	23,311	24,573	28,120	32,410	36,170	40,440	43,920	28	12
Unit Shipments or Seats	9,254	15,314	22,112	23,311	24,573	28,120	32,410	36,170	40,440	43,920	28	12
CPU Installed Base	25,956	39,453	58,490	76,564	93,708	111,450	130,240	148,910	167,920	187,810	38	15
Installed Seats	25,956	39,453	58,490	76,564	93,708	111,450	130,240	148,910	167,920	187,810	38	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	52.5	50.3	52.7	49.5	48.5	46.2	44.2	43.0	42.0	41.1	-2	-3
Hardware-Only ASP	24.3	19.0	14.5	16.0	12.9	11.6	10.7	10.1	9.7	9.4	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	243	376	451	464	389	385	401	415	440	462	12	4
CPU Revenue	166	273	381	399	339	340	356	370	395	415	19	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	77	103	70	64	50	45	45	45	45	47	-10	-1
Software Revenue	271	329	446	468	494	509	555	637	723	808	16	10
Bundled	127	146	219	158	99	78	72	68	65	69	-6	-7
Unbundled	144	183	227	310	396	432	483	569	658	739	29	13
Service Revenue	94	131	169	228	238	265	301	343	391	438	26	13
Total Factory Revenue	608	836	1,065	1,160	1,121	1,159	1,257	1,395	1,554	1,708	17	9
Increase over Prior Year (%)	44	38	27	9	-3	3	8	11	11	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 30
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Worldwide
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	374	1,067	2,143	2,249	655	590	570	550	550	540	15	-4
Unit Shipments or Seats	1,480	1,608	2,981	2,953	1,406	1,140	1,050	990	960	910	-1	-8
CPU Installed Base	1,684	2,700	4,738	6,785	7,150	7,280	7,210	6,810	6,200	5,590	44	-5
Installed Seats	4,093	5,619	8,413	10,990	11,830	11,970	11,780	11,270	10,470	9,660	30	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	200.8	195.6	192.6	77.8	67.4	61.6	58.9	54.5	50.5	47.1	-24	-7
Hardware-Only ASP	3,507.4	149.0	66.9	64.3	163.8	148.3	136.3	125.4	115.5	106.4	-54	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	195	166	162	142	77	63	58	53	51	47	-21	-9
CPU Revenue	95	111	107	109	51	42	38	35	33	31	-15	-10
Terminal Revenue	47	14	25	22	21	17	16	15	15	14	-18	-8
Peripheral Revenue (Turnkey)	53	41	29	11	5	4	4	3	3	3	-44	-13
Software Revenue	43	36	33	40	20	13	10	7	6	5	-18	-25
Bundled	7	5	4	7	6	4	4	3	3	2	-6	-17
Unbundled	36	32	29	33	14	9	6	4	3	2	-21	-30
Service Revenue	34	46	46	43	25	22	20	18	17	16	-7	-9
Total Factory Revenue	272	248	241	224	122	99	87	79	73	68	-18	-11
Increase over Prior Year (%)	6	-9	-3	-7	-45	-19	-12	-10	-7	-7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 31
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Worldwide
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	2,445	3,220	4,410	6,080	8,060	10,060	NA	33
Unit Shipments or Seats	NA	NA	NA	NA	2,445	3,220	4,410	6,090	8,060	10,060	NA	33
CPU Installed Base	NA	NA	NA	NA	2,445	5,520	9,560	14,640	21,090	28,060	NA	63
Installed Seats	NA	NA	NA	NA	2,445	5,520	9,560	14,640	21,090	28,060	NA	63
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	89.3	84.5	80.7	77.3	73.9	70.7	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	30.1	27.2	25.0	23.8	23.1	22.7	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	82	97	122	158	201	244	NA	24
CPU Revenue	NA	NA	NA	NA	64	78	99	131	170	210	NA	27
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	18	19	23	27	31	34	NA	13
Software Revenue	NA	NA	NA	NA	11	13	15	19	22	26	NA	18
Bundled	NA	NA	NA	NA	9	10	12	14	16	18	NA	14
Unbundled	NA	NA	NA	NA	2	3	4	5	6	8	NA	30
Service Revenue	NA	NA	NA	NA	23	29	37	49	64	79	NA	28
Total Factory Revenue	NA	NA	NA	NA	116	139	174	226	287	348	NA	25
Increase over Prior Year (%)	NA	NA	NA	NA	NA	19	25	30	27	21		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 32
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Worldwide
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	19,068	23,601	34,705	42,299	46,928	47,640	48,610	45,210	32,980	22,890	25	-13
Unit Shipments or Seats	19,068	23,601	34,705	42,299	46,928	47,630	48,590	45,200	32,970	22,890	25	-13
CPU Installed Base	53,379	73,247	100,163	129,767	159,211	184,210	204,550	215,230	208,120	187,460	31	3
Installed Seats	53,379	73,247	100,163	129,767	159,211	184,210	204,550	215,230	208,120	187,460	31	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	12.3	19.3	24.0	21.7	14.1	12.7	11.3	10.6	9.9	9.6	3	-7
Hardware-Only ASP	4.7	5.2	5.1	4.9	4.3	4.0	3.7	3.5	3.3	3.2	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	95	134	200	224	215	199	185	161	111	74	23	-19
CPU Revenue	90	124	186	212	204	189	176	154	107	71	23	-19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	5	9	13	13	11	10	9	8	5	3	19	-25
Software Revenue	82	92	122	146	161	165	172	178	183	185	18	3
Bundled	9	7	15	16	18	12	8	5	3	1	17	-40
Unbundled	73	85	106	130	144	153	165	173	180	184	19	5
Service Revenue	12	15	22	25	29	29	31	33	31	30	24	1
Total Factory Revenue	190	240	344	396	405	393	389	372	325	289	21	-7
Increase over Prior Year (%)	-31	26	43	15	2	-3	-1	-4	-13	-11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 33
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: North America
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	13,112	21,131	25,854	27,985	31,579	32,980	32,450	32,380	29,890	28,490	25	-2
Unit Shipments or Seats	13,583	21,388	26,121	28,412	32,020	33,290	32,720	32,620	30,140	28,700	24	-2
CPU Installed Base	47,281	64,386	82,992	100,066	117,861	134,000	146,600	155,010	157,600	156,630	26	6
Installed Seats	48,427	65,759	84,560	101,958	120,084	136,310	148,910	157,320	159,880	158,830	25	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	50.7	59.4	58.0	55.6	53.1	51.6	50.8	50.5	50.0	48.7	1	-2
Hardware-Only ASP	14.9	11.4	10.5	10.5	8.8	8.5	8.7	9.3	10.7	11.8	-12	6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	241	327	351	344	322	315	315	330	347	363	7	2
CPU Revenue	153	245	297	298	280	277	278	291	305	320	16	3
Terminal Revenue	22	7	10	12	12	9	8	7	7	7	-15	-10
Peripheral Revenue (Turnkey)	66	75	45	34	30	29	29	32	34	36	-18	3
Software Revenue	177	231	294	331	336	335	349	389	431	464	17	7
Bundled	51	71	84	70	42	34	31	31	32	34	-5	-4
Unbundled	126	161	211	262	294	302	318	358	399	430	24	8
Service Revenue	71	97	119	141	157	172	194	222	252	278	22	12
Total Factory Revenue	489	655	764	816	815	822	858	940	1,030	1,105	14	6
Increase over Prior Year (%)	-3	34	17	7	-0	1	4	10	9	7		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 34
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: North America
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,475	7,266	9,795	10,256	10,962	12,940	15,120	17,150	19,540	21,440	25	14
Unit Shipments or Seats	4,475	7,266	9,795	10,256	10,962	12,940	15,120	17,150	19,540	21,440	25	14
CPU Installed Base	15,170	21,160	28,916	36,027	42,991	50,780	59,510	68,560	78,390	88,900	30	16
Installed Seats	15,170	21,160	28,916	36,027	42,991	50,780	59,510	68,560	78,390	88,900	30	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	43.1	52.2	55.2	53.9	47.6	45.4	43.6	42.3	41.2	40.3	3	-3
Hardware-Only ASP	23.7	19.4	14.9	15.8	12.5	11.4	10.4	9.8	9.5	9.2	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	105	173	195	194	162	166	175	184	200	213	12	6
CPU Revenue	73	127	171	169	148	154	163	172	187	199	20	6
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	32	47	25	25	14	13	12	13	13	14	-19	-0
Software Revenue	115	163	218	244	253	261	281	326	371	407	22	10
Bundled	45	67	83	67	35	27	23	22	22	22	-6	-8
Unbundled	70	96	135	176	219	234	258	304	350	385	33	12
Service Revenue	46	65	87	110	121	136	157	180	204	226	27	13
Total Factory Revenue	266	402	500	548	536	563	613	689	776	845	19	10
Increase over Prior Year (%)	26	51	25	9	-2	5	9	13	13	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 35
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: North America
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	265	575	1,158	1,050	209	170	160	160	180	180	-6	-3
Unit Shipments or Seats	736	832	1,425	1,477	651	480	430	400	420	390	-3	-10
CPU Installed Base	1,097	1,637	2,726	3,650	3,674	3,560	3,350	3,000	2,580	2,220	35	-10
Installed Seats	2,243	3,010	4,293	5,542	5,897	5,870	5,670	5,310	4,860	4,420	27	-6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	134.2	185.1	152.7	133.9	206.3	197.1	189.0	181.1	173.5	166.5	11	-4
Hardware-Only ASP	3,668.5	146.9	60.7	63.5	171.9	156.5	143.7	131.7	120.6	110.9	-53	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	99	89	79	68	35	26	23	21	21	20	-23	-11
CPU Revenue	44	54	53	51	22	16	14	13	13	12	-16	-11
Terminal Revenue	22	7	10	12	12	9	8	7	7	7	-15	-10
Peripheral Revenue (Turnkey)	33	28	17	6	2	1	1	1	1	1	-51	-15
Software Revenue	23	20	20	20	9	5	3	1	1	0	-20	-48
Bundled	3	2	0	2	1	1	0	0	0	0	-17	-47
Unbundled	20	19	19	18	8	5	2	1	1	0	-21	-48
Service Revenue	20	24	24	22	12	10	8	7	7	6	-11	-13
Total Factory Revenue	141	133	123	110	57	41	33	29	29	27	-20	-14
Increase over Prior Year (%)	-6	-6	-7	-11	-48	-28	-19	-12	-1	-9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 36
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: North America
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	1,352	1,780	2,430	3,430	4,470	5,450	NA	32
Unit Shipments or Seats	NA	NA	NA	NA	1,352	1,780	2,430	3,430	4,470	5,450	NA	32
CPU Installed Base	NA	NA	NA	NA	1,352	3,050	5,280	8,150	11,720	15,450	NA	63
Installed Seats	NA	NA	NA	NA	1,352	3,050	5,280	8,150	11,720	15,450	NA	63
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	91.1	87.0	83.5	80.0	76.6	73.5	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	28.2	25.7	23.6	22.4	21.7	21.3	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	44	52	65	86	107	126	NA	23
CPU Revenue	NA	NA	NA	NA	33	40	51	69	87	105	NA	26
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	12	12	14	17	20	21	NA	13
Software Revenue	NA	NA	NA	NA	7	8	10	12	14	16	NA	17
Bundled	NA	NA	NA	NA	6	6	7	9	10	11	NA	14
Unbundled	NA	NA	NA	NA	1	2	2	3	4	5	NA	28
Service Revenue	NA	NA	NA	NA	12	16	20	26	34	40	NA	26
Total Factory Revenue	NA	NA	NA	NA	64	76	94	124	155	182	NA	23
Increase over Prior Year (%)	NA	NA	NA	NA	NA	19	24	31	25	18		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 37
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: North America
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	8,373	13,290	14,900	16,679	19,055	18,090	14,740	11,650	5,700	1,430	23	-40
Unit Shipments or Seats	8,373	13,290	14,900	16,679	19,055	18,090	14,740	11,650	5,700	1,430	23	-40
CPU Installed Base	31,013	41,590	51,351	60,388	69,844	76,620	78,460	75,300	64,900	50,050	23	-6
Installed Seats	31,013	41,590	51,351	60,388	69,844	76,620	78,460	75,300	64,900	50,050	23	-6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	32.9	88.0	32.1	59.7	54.0	48.6	43.7	41.1	39.1	37.5	13	-7
Hardware-Only ASP	4.3	4.6	5.1	4.8	4.2	3.9	3.6	3.3	3.2	3.0	-1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	38	65	76	82	80	70	53	39	18	4	20	-44
CPU Revenue	37	64	74	78	77	68	51	38	18	4	20	-44
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	3	4	3	3	2	1	1	0	29	-46
Software Revenue	39	48	56	68	66	61	55	50	45	40	14	-9
Bundled	3	2	0	0	0	0	0	0	0	0	-46	-100
Unbundled	36	46	56	68	66	61	55	50	45	40	16	-9
Service Revenue	5	8	8	10	11	10	9	9	7	6	21	-12
Total Factory Revenue	82	121	141	159	157	141	117	98	70	50	18	-20
Increase over Prior Year (%)	-43	47	17	13	-1	-10	-17	-17	-28	-28		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 38
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Europe
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	10,034	12,134	20,945	24,068	26,960	30,540	35,030	35,230	29,210	22,980	28	-3
Unit Shipments or Seats	10,326	12,339	21,297	24,238	27,151	30,670	35,130	35,320	29,280	23,050	27	-3
CPU Installed Base	20,196	31,407	50,163	69,891	89,838	109,910	130,390	146,700	152,450	148,380	45	11
Installed Seats	20,721	32,140	51,243	71,116	91,179	111,270	131,700	147,960	153,590	149,430	45	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	34.2	40.7	53.8	50.9	42.8	38.9	36.1	36.2	39.3	43.2	6	0
Hardware-Only ASP	12.6	14.6	10.2	9.6	8.2	7.6	7.0	7.1	8.2	10.3	-10	5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	152	220	279	285	252	257	270	272	261	256	13	0
CPU Revenue	104	175	233	250	221	227	238	240	230	224	21	0
Terminal Revenue	10	4	11	7	6	6	6	5	5	5	-9	-6
Peripheral Revenue (Turnkey)	39	41	35	29	25	24	26	26	26	27	-11	1
Software Revenue	128	131	158	179	186	193	213	238	261	280	10	9
Bundled	39	42	65	54	36	30	28	27	27	28	-2	-5
Unbundled	89	88	93	125	149	163	186	211	234	252	14	11
Service Revenue	40	60	80	99	98	107	121	135	150	164	26	11
Total Factory Revenue	320	411	517	563	537	558	604	646	672	699	14	5
Increase over Prior Year (%)	45	28	26	9	-5	4	8	7	4	4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 39
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Europe
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	2,982	4,797	7,081	7,154	7,564	8,530	9,540	10,400	11,340	11,940	26	10
Unit Shipments or Seats	2,982	4,797	7,081	7,154	7,564	8,530	9,540	10,400	11,340	11,940	26	10
CPU Installed Base	6,275	10,768	17,268	23,210	28,793	34,310	39,630	44,660	49,380	54,040	46	13
Installed Seats	6,275	10,768	17,268	23,210	28,793	34,310	39,630	44,660	49,380	54,040	46	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	45.3	46.9	56.5	54.4	53.8	51.6	49.6	48.1	47.0	45.9	4	-3
Hardware-Only ASP	24.5	19.5	14.4	16.2	12.8	11.6	10.6	10.0	9.6	9.3	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	74	121	147	150	120	117	118	120	124	127	13	1
CPU Revenue	49	89	125	130	104	103	103	105	109	112	21	1
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	25	31	22	20	15	14	14	14	15	15	-11	0
Software Revenue	91	94	116	130	130	127	132	143	152	161	9	4
Bundled	36	38	62	51	33	25	22	22	21	23	-2	-7
Unbundled	56	56	54	80	97	102	110	121	131	139	15	7
Service Revenue	27	39	58	77	74	79	87	95	104	112	29	9
Total Factory Revenue	192	254	320	357	324	324	337	358	381	401	14	4
Increase over Prior Year (%)	73	32	26	11	-9	0	4	6	7	5		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 40
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Europe
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	18	297	680	627	171	180	180	180	170	180	76	1
Unit Shipments or Seats	310	502	1,032	797	362	330	310	290	260	250	4	-7
CPU Installed Base	177	466	1,131	1,729	1,865	1,970	2,010	1,930	1,770	1,620	80	-3
Installed Seats	702	1,199	2,212	2,954	3,206	3,330	3,320	3,180	2,910	2,670	46	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	654.1	147.8	161.1	143.9	156.0	136.1	130.1	123.3	117.0	111.4	-30	-7
Hardware-Only ASP	NA	195.8	79.3	72.8	149.2	137.5	126.4	116.2	106.7	98.4	NA	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	42	54	57	46	25	24	22	20	18	17	-12	-7
CPU Revenue	21	42	38	37	17	16	15	14	12	12	-5	-7
Terminal Revenue	10	4	11	7	6	6	6	5	5	5	-9	-6
Peripheral Revenue (Turnkey)	11	8	8	3	1	1	1	1	1	1	-40	-10
Software Revenue	13	10	6	8	4	3	3	2	2	2	-25	-16
Bundled	1	1	0	1	1	1	1	0	0	0	-3	-20
Unbundled	12	8	6	7	3	3	2	2	2	2	-27	-15
Service Revenue	8	16	15	15	9	8	8	7	7	6	3	-6
Total Factory Revenue	63	79	78	69	38	35	33	30	27	25	-12	-8
Increase over Prior Year (%)	63	26	-2	-11	-45	-7	-6	-8	-12	-6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 41
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Europe
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	609	810	1,170	1,680	2,400	3,220	NA	40
Unit Shipments or Seats	NA	NA	NA	NA	609	810	1,170	1,680	2,400	3,220	NA	40
CPU Installed Base	NA	NA	NA	NA	609	1,390	2,460	3,890	5,870	8,270	NA	68
Installed Seats	NA	NA	NA	NA	609	1,390	2,460	3,890	5,870	8,270	NA	68
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	76.4	73.4	70.5	67.9	65.0	62.5	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	34.6	31.2	28.6	27.1	26.3	25.7	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	22	27	35	48	66	86	NA	31
CPU Revenue	NA	NA	NA	NA	19	23	30	42	58	77	NA	32
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	3	4	5	6	7	9	NA	23
Software Revenue	NA	NA	NA	NA	2	2	3	4	5	6	NA	25
Bundled	NA	NA	NA	NA	2	2	2	3	4	4	NA	23
Unbundled	NA	NA	NA	NA	0	0	1	1	1	1	NA	35
Service Revenue	NA	NA	NA	NA	7	9	12	16	22	29	NA	35
Total Factory Revenue	NA	NA	NA	NA	30	37	50	67	92	120	NA	32
Increase over Prior Year (%)	NA	NA	NA	NA	NA	23	33	35	38	30		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 42
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Europe
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,034	7,040	13,184	16,286	18,617	21,010	24,140	22,980	15,300	7,650	28	-16
Unit Shipments or Seats	7,034	7,040	13,184	16,286	18,617	20,990	24,110	22,960	15,280	7,640	28	-16
CPU Installed Base	13,744	20,173	31,763	44,953	58,570	72,240	86,280	96,220	95,430	84,450	44	8
Installed Seats	13,744	20,173	31,763	44,953	58,570	72,240	86,280	96,220	95,430	84,450	44	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	9.5	14.5	27.0	25.0	9.8	11.0	10.2	9.8	9.5	9.3	1	-1
Hardware-Only ASP	4.8	6.0	5.2	5.2	4.5	4.2	3.8	3.6	3.4	3.3	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	37	46	75	89	86	90	95	85	53	26	24	-21
CPU Revenue	34	44	69	83	81	85	89	80	50	24	25	-21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	2	6	6	5	5	5	5	3	1	13	-21
Software Revenue	24	27	36	40	50	61	75	90	102	111	20	17
Bundled	3	3	3	3	2	3	3	2	1	1	-14	-15
Unbundled	21	24	33	38	49	58	73	87	100	110	23	18
Service Revenue	5	5	7	8	9	11	14	17	17	16	17	13
Total Factory Revenue	65	78	118	137	145	161	184	191	172	153	22	1
Increase over Prior Year (%)	-7	20	51	16	5	12	14	4	-10	-11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 43
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Asia
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,995	6,278	11,022	14,255	14,026	13,280	14,230	14,100	14,200	14,460	29	1
Unit Shipments or Seats	5,308	6,335	11,210	14,329	14,109	13,340	14,290	14,150	14,240	14,500	28	1
CPU Installed Base	12,158	17,857	27,499	39,143	49,162	56,740	63,340	67,560	69,980	71,660	42	8
Installed Seats	12,748	18,509	28,340	40,028	50,060	57,560	64,050	68,210	70,550	72,180	41	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	68.4	51.0	41.4	34.3	29.5	30.1	32.7	35.2	37.1	38.2	-19	5
Hardware-Only ASP	18.4	12.2	9.4	9.5	10.1	9.7	9.1	9.2	9.4	9.7	-14	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	127	119	172	187	175	156	158	155	156	162	8	-2
CPU Revenue	85	80	136	160	144	130	132	131	133	139	14	-1
Terminal Revenue	14	3	4	2	2	2	1	1	1	1	-36	-16
Peripheral Revenue (Turnkey)	28	36	32	25	28	25	25	23	22	23	0	-4
Software Revenue	88	92	144	138	158	164	180	203	230	268	16	11
Bundled	52	44	89	57	52	40	36	32	27	28	-0	-12
Unbundled	36	48	55	82	106	124	144	171	203	239	31	18
Service Revenue	29	33	36	53	58	64	71	81	95	112	19	14
Total Factory Revenue	244	244	352	378	391	384	409	439	482	542	13	7
Increase over Prior Year (%)	21	0	44	7	3	-2	7	7	10	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 44
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Asia
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,634	3,073	5,053	5,605	5,715	6,250	7,280	8,070	8,910	9,810	37	11
Unit Shipments or Seats	1,634	3,073	5,053	5,605	5,715	6,250	7,280	8,070	8,910	9,810	37	11
CPU Installed Base	3,951	6,815	11,468	16,293	20,686	24,930	29,370	33,620	37,690	42,010	51	15
Installed Seats	3,951	6,815	11,468	16,293	20,686	24,930	29,370	33,620	37,690	42,010	51	15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	83.5	53.4	47.3	40.9	45.2	43.0	41.3	40.0	39.0	38.2	-14	-3
Hardware-Only ASP	25.7	16.5	13.9	16.5	14.2	12.6	11.6	10.9	10.5	10.2	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	60	79	106	116	104	98	104	106	110	117	15	2
CPU Revenue	41	54	83	96	83	80	86	89	93	100	19	4
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	19	25	23	19	20	18	18	17	16	17	2	-3
Software Revenue	63	71	110	93	109	118	137	163	193	233	15	16
Bundled	45	40	74	39	31	26	26	24	22	24	-9	-5
Unbundled	18	30	36	53	77	92	110	138	171	209	44	22
Service Revenue	20	26	24	40	42	48	56	66	80	97	20	18
Total Factory Revenue	143	175	240	248	254	264	296	335	383	446	15	12
Increase over Prior Year (%)	61	22	37	3	3	4	12	13	14	17		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 45
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Asia
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	87	187	276	533	262	230	210	190	170	150	32	-11
Unit Shipments or Seats	400	245	465	607	346	290	260	230	210	180	-4	-12
CPU Installed Base	348	529	788	1,282	1,484	1,630	1,730	1,740	1,700	1,590	44	1
Installed Seats	939	1,182	1,629	2,168	2,383	2,440	2,440	2,390	2,270	2,100	26	-3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	319.5	425.1	357.2	56.9	54.4	52.0	49.8	47.8	45.8	44.0	-36	-4
Hardware-Only ASP	1,552.3	76.3	55.5	47.2	176.7	156.3	143.6	132.6	121.1	111.4	-42	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	48	20	22	23	15	12	10	9	8	7	-26	-15
CPU Revenue	27	12	14	19	11	9	8	7	6	5	-20	-15
Terminal Revenue	14	3	4	2	2	2	1	1	1	1	-36	-16
Peripheral Revenue (Turnkey)	8	5	4	2	2	1	1	1	1	1	-31	-15
Software Revenue	7	6	7	11	6	4	4	3	3	2	-5	-17
Bundled	4	2	3	4	4	3	3	3	2	2	0	-13
Unbundled	3	4	4	7	2	1	1	1	1	0	-11	-29
Service Revenue	6	5	6	6	3	3	3	3	2	2	-12	-9
Total Factory Revenue	61	31	35	40	24	20	17	15	13	11	-21	-15
Increase over Prior Year (%)	18	-50	13	17	-40	-19	-14	-13	-13	-14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 46
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Asia
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	437	560	720	850	1,010	1,160	NA	22
Unit Shipments or Seats	NA	NA	NA	NA	437	560	720	850	1,010	1,160	NA	22
CPU Installed Base	NA	NA	NA	NA	437	970	1,620	2,300	3,050	3,710	NA	53
Installed Seats	NA	NA	NA	NA	437	970	1,620	2,300	3,050	3,710	NA	53
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	98.3	89.9	86.4	83.0	79.6	76.4	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	30.3	27.3	25.1	23.9	23.1	22.7	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	15	17	20	22	25	28	NA	13
CPU Revenue	NA	NA	NA	NA	12	14	16	19	22	24	NA	16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	3	3	4	4	4	4	NA	3
Software Revenue	NA	NA	NA	NA	2	2	3	3	4	4	NA	14
Bundled	NA	NA	NA	NA	2	2	2	2	2	2	NA	5
Unbundled	NA	NA	NA	NA	0	1	1	1	1	2	NA	34
Service Revenue	NA	NA	NA	NA	4	5	5	6	7	8	NA	18
Total Factory Revenue	NA	NA	NA	NA	21	24	28	32	36	41	NA	14
Increase over Prior Year (%)	NA	NA	NA	NA	NA	15	17	13	15	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 47
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Asia
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,273	3,018	5,692	8,117	7,612	6,230	6,020	4,990	4,100	3,350	23	-15
Unit Shipments or Seats	3,273	3,018	5,692	8,117	7,612	6,240	6,030	4,990	4,110	3,350	23	-15
CPU Installed Base	7,859	10,512	15,243	21,568	26,555	29,220	30,620	29,900	27,540	24,350	36	-2
Installed Seats	7,859	10,512	15,243	21,568	26,555	29,220	30,620	29,900	27,540	24,350	36	-2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.4	16.4	23.0	20.5	14.7	13.1	11.8	11.1	10.6	10.2	7	-7
Hardware-Only ASP	5.7	6.3	4.6	4.4	4.2	3.8	3.5	3.3	3.2	3.0	-7	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	19	21	44	48	42	29	24	18	14	10	22	-24
CPU Revenue	17	14	39	45	39	27	22	17	13	10	22	-24
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	7	5	3	3	2	2	1	1	1	24	-25
Software Revenue	18	15	27	35	41	40	37	34	31	29	24	-7
Bundled	3	2	12	13	16	9	5	3	1	1	48	-48
Unbundled	14	14	15	21	26	30	32	31	30	28	15	2
Service Revenue	2	2	7	8	9	7	7	6	5	5	38	-12
Total Factory Revenue	39	38	78	90	92	76	68	58	50	44	24	-14
Increase over Prior Year (%)	-35	-1	102	16	2	-17	-11	-15	-14	-12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 48
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Rest of World
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	554	440	1,139	1,551	2,037	2,770	4,280	6,310	8,720	11,480	38	41
Unit Shipments or Seats	585	461	1,169	1,584	2,072	2,810	4,320	6,350	8,770	11,540	37	41
CPU Installed Base	1,384	1,749	2,736	4,015	5,653	7,800	11,240	16,320	23,300	32,260	42	42
Installed Seats	1,533	1,911	2,922	4,219	5,870	8,010	11,460	16,570	23,570	32,560	40	41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.2	24.9	54.4	48.7	48.0	42.2	35.9	27.5	49.6	47.9	-10	-0
Hardware-Only ASP	20.1	19.5	8.2	8.6	6.8	5.8	5.1	4.6	4.3	4.0	-24	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	12	9	11	14	14	16	22	29	38	46	3	27
CPU Revenue	9	7	9	12	13	15	20	27	35	44	8	28
Terminal Revenue	1	1	1	1	1	1	1	1	1	2	-1	11
Peripheral Revenue (Turnkey)	2	1	1	1	1	1	1	1	1	1	-28	13
Software Revenue	3	4	4	5	6	8	10	11	12	12	21	15
Bundled	1	1	0	0	0	0	0	0	0	0	-17	-7
Unbundled	2	3	3	5	6	8	10	11	11	12	30	16
Service Revenue	2	2	2	3	3	3	4	6	7	9	3	29
Total Factory Revenue	18	14	17	22	23	27	36	46	56	68	7	24
Increase over Prior Year (%)	-34	-17	15	31	5	20	33	26	23	20		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 49
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
Region: Rest of World
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	163	178	182	295	332	390	470	560	640	740	20	17
Unit Shipments or Seats	163	178	182	295	332	390	470	560	640	740	20	17
CPU Installed Base	559	710	838	1,034	1,237	1,440	1,730	2,060	2,450	2,860	22	18
Installed Seats	559	710	838	1,034	1,237	1,440	1,730	2,060	2,450	2,860	22	18
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.9	20.9	51.2	48.2	53.1	50.7	48.6	47.2	46.0	45.0	-1	-3
Hardware-Only ASP	26.2	20.6	6.7	13.5	9.8	8.9	8.2	7.7	7.4	7.2	-22	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	3	2	4	4	4	4	4	5	5	-6	9
CPU Revenue	4	3	2	4	3	3	4	4	5	5	-3	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	0	0	0	0	0	0	0	0	0	-20	3
Software Revenue	1	2	2	2	3	3	5	6	6	7	23	23
Bundled	1	1	0	0	0	0	0	0	0	0	-12	-8
Unbundled	1	1	1	2	2	3	5	6	6	7	43	26
Service Revenue	1	1	1	1	1	1	2	2	3	3	4	23
Total Factory Revenue	7	6	5	8	7	9	11	12	14	16	2	17
Increase over Prior Year (%)	-31	-8	-21	57	-4	19	28	13	14	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 50
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Rest of World
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4	8	28	39	13	10	20	20	30	30	34	18
Unit Shipments or Seats	34	30	58	72	48	50	60	70	80	90	9	13
CPU Installed Base	62	68	93	123	126	120	130	140	150	160	20	5
Installed Seats	210	229	278	327	343	330	350	390	420	460	13	6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	270.2	463.9	449.0	110.0	134.6	128.6	123.3	118.2	113.2	108.6	-16	-4
Hardware-Only ASP	55,555.6	481.8	115.9	95.4	185.2	168.6	154.8	141.9	129.9	119.5	-76	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	6	4	3	4	2	2	3	3	4	4	-21	11
CPU Revenue	4	3	2	3	1	1	2	2	2	2	-23	11
Terminal Revenue	1	1	1	1	1	1	1	1	1	2	-1	11
Peripheral Revenue (Turnkey)	1	0	0	0	0	0	0	0	0	0	-48	9
Software Revenue	0	1	0	0	0	0	0	0	0	0	-6	-16
Bundled	0	0	0	0	0	0	0	0	0	0	-24	-6
Unbundled	0	1	0	0	0	0	0	0	0	0	0	-18
Service Revenue	1	1	1	1	1	1	1	1	1	1	-11	13
Total Factory Revenue	7	6	5	5	3	3	4	4	5	5	-18	10
Increase over Prior Year (%)	-51	-21	-21	10	-35	-8	22	18	12	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 51

CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Rest of World
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	47	70	90	130	180	240	NA	39
Unit Shipments or Seats	NA	NA	NA	NA	47	70	90	130	180	240	NA	39
CPU Installed Base	NA	NA	NA	NA	47	110	200	310	450	620	NA	68
Installed Seats	NA	NA	NA	NA	47	110	200	310	450	620	NA	68
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	57.7	55.1	52.9	50.7	48.5	46.6	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	20.5	18.7	17.1	16.3	15.8	15.5	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	1	1	2	2	3	4	NA	31
CPU Revenue	NA	NA	NA	NA	1	1	2	2	3	4	NA	31
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	0	NA	30
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	25
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	25
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	0	0	1	1	1	1	NA	33
Total Factory Revenue	NA	NA	NA	NA	1	2	2	3	4	5	NA	31
Increase over Prior Year (%)	NA	NA	NA	NA	NA	30	29	34	31	33		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 52
CAD/CAM/CAE/GIS History and Forecast Update

Application: Electronic CAE
 Region: Rest of World
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	388	253	928	1,217	1,644	2,300	3,700	5,590	7,880	10,470	43	45
Unit Shipments or Seats	388	253	928	1,217	1,644	2,300	3,700	5,590	7,880	10,470	43	45
CPU Installed Base	763	972	1,806	2,858	4,242	6,130	9,190	13,810	20,250	28,610	54	46
Installed Seats	763	972	1,806	2,858	4,242	6,130	9,190	13,810	20,250	28,610	54	46
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	36.8	29.4	32.2	8.1	6.9	6.2	5.6	5.3	5.0	4.8	-34	-7
Hardware-Only ASP	4.8	6.1	5.2	4.8	4.4	4.0	3.7	3.5	3.3	3.2	-2	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	5	6	7	9	14	20	26	33	39	36
CPU Revenue	2	2	5	6	7	9	14	19	26	33	40	36
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	9	36
Software Revenue	1	1	2	3	3	4	5	5	5	5	24	8
Bundled	0	0	0	0	0	0	0	0	0	0	-49	-100
Unbundled	1	1	2	3	3	4	5	5	5	5	28	8
Service Revenue	0	0	0	0	0	1	1	1	2	3	12	51
Total Factory Revenue	4	3	7	9	11	14	20	26	33	42	32	30
Increase over Prior Year (%)	73	-27	176	26	20	28	39	33	28	24		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 53
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Worldwide
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,172	6,383	10,178	12,378	15,204	21,600	28,090	35,460	44,380	54,860	38	29
Unit Shipments or Seats	4,536	6,637	10,206	12,323	15,133	21,620	28,110	35,470	44,390	54,880	35	29
CPU Installed Base	8,657	14,663	24,027	34,702	47,035	64,180	86,050	112,660	144,750	183,130	53	31
Installed Seats	10,108	16,179	25,369	35,755	47,769	64,690	86,420	112,910	144,940	183,300	47	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	79.1	84.4	70.2	58.6	56.6	52.9	51.5	49.8	48.5	47.3	-8	-4
Hardware-Only ASP	26.6	25.6	18.5	17.8	15.3	12.7	11.7	11.0	10.6	10.3	-13	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	137	189	212	249	264	302	354	413	492	582	18	17
CPU Revenue	94	149	196	231	246	288	339	399	476	565	27	18
Terminal Revenue	21	6	3	3	3	1	1	1	0	0	-39	-34
Peripheral Revenue (Turnkey)	23	33	13	14	15	13	14	14	15	17	-10	2
Software Revenue	166	159	169	184	196	206	224	255	287	322	4	10
Bundled	36	35	36	38	32	27	26	25	23	22	-3	-7
Unbundled	129	124	132	147	164	178	198	230	264	300	6	13
Service Revenue	34	63	73	94	115	123	147	175	210	252	35	17
Total Factory Revenue	337	411	453	527	574	631	725	843	989	1,156	14	15
Increase over Prior Year (%)	22	22	10	16	9	10	15	16	17	17		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 54
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Worldwide
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	2,339	4,539	8,430	10,939	13,123	19,130	25,240	32,160	40,490	50,190	54	31
Unit Shipments or Seats	2,339	4,539	8,430	10,939	13,123	19,130	25,240	32,160	40,490	50,190	54	31
CPU Installed Base	5,422	9,701	17,612	27,481	38,718	54,650	75,070	100,020	130,180	166,430	63	34
Installed Seats	5,422	9,701	17,612	27,481	38,718	54,650	75,070	100,020	130,180	166,430	63	34
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	93.0	100.4	66.3	58.5	56.8	53.6	51.8	50.2	48.7	47.2	-12	-4
Hardware-Only ASP	22.0	19.2	14.7	14.9	12.6	11.5	10.6	10.0	9.7	9.4	-13	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	71	117	144	190	194	244	290	343	411	488	28	20
CPU Revenue	56	89	135	180	185	235	281	334	402	478	35	21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	16	27	9	10	9	9	9	9	10	10	-12	2
Software Revenue	127	135	144	166	181	193	210	239	270	302	9	11
Bundled	31	34	33	36	31	27	25	24	23	21	-0	-7
Unbundled	96	101	111	130	150	167	185	215	247	281	12	13
Service Revenue	24	42	55	75	91	106	129	154	185	223	40	20
Total Factory Revenue	222	294	342	431	466	543	629	736	866	1,013	20	17
Increase over Prior Year (%)	32	32	17	26	8	17	16	17	18	17		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 55
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Worldwide
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	94	417	1,261	1,097	335	140	120	100	80	70	37	-27
Unit Shipments or Seats	459	671	1,289	1,042	264	140	120	100	80	70	-13	-23
CPU Installed Base	840	1,177	2,333	3,294	3,480	3,410	3,240	2,900	2,380	1,900	43	-11
Installed Seats	2,291	2,693	3,675	4,347	4,214	3,920	3,610	3,150	2,570	2,070	16	-13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	375.5	212.4	604.1	83.8	76.9	72.3	69.5	66.5	63.9	61.4	-33	-4
Hardware-Only ASP	1,451.8	149.6	45.8	49.9	118.5	109.2	100.4	92.2	84.2	78.1	-47	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	58	63	65	57	34	11	9	7	6	5	-12	-33
CPU Revenue	30	52	57	49	29	9	8	6	5	4	-1	-33
Terminal Revenue	21	6	3	3	3	1	1	1	0	0	-39	-34
Peripheral Revenue (Turnkey)	7	5	4	4	3	1	1	1	1	0	-20	-33
Software Revenue	23	20	22	17	5	3	2	2	2	2	-32	-20
Bundled	5	0	3	1	1	1	1	1	0	0	-28	-24
Unbundled	19	20	19	16	4	2	2	1	1	1	-34	-18
Service Revenue	9	21	18	18	13	5	4	4	3	3	8	-25
Total Factory Revenue	91	104	105	92	52	19	16	13	11	9	-13	-29
Increase over Prior Year (%)	-11	15	1	-13	-43	-64	-16	-17	-17	-15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 56
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Worldwide
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	1,209	1,810	2,330	2,880	3,570	4,440	NA	30
Unit Shipments or Seats	NA	NA	NA	NA	1,209	1,810	2,330	2,880	3,570	4,440	NA	30
CPU Installed Base	NA	NA	NA	NA	1,209	2,950	5,080	7,440	10,160	13,050	NA	61
Installed Seats	NA	NA	NA	NA	1,209	2,950	5,080	7,440	10,160	13,050	NA	61
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	27.1	24.4	22.5	21.4	20.6	20.1	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	33	44	52	62	74	89	NA	22
CPU Revenue	NA	NA	NA	NA	30	41	49	57	69	83	NA	22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	2	3	4	4	5	6	NA	21
Software Revenue	NA	NA	NA	NA	9	9	11	13	16	17	NA	14
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	9	9	11	13	16	17	NA	14
Service Revenue	NA	NA	NA	NA	10	12	14	17	21	26	NA	21
Total Factory Revenue	NA	NA	NA	NA	52	64	77	92	110	133	NA	21
Increase over Prior Year (%)	NA	NA	NA	NA	NA	24	20	19	20	20		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 57
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Worldwide
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,739	1,427	487	342	536	520	400	310	240	170	-25	-21
Unit Shipments or Seats	1,739	1,427	487	342	536	540	420	330	250	180	-25	-20
CPU Installed Base	2,396	3,785	4,082	3,927	3,628	3,170	2,660	2,290	2,020	1,750	11	-14
Installed Seats	2,396	3,785	4,082	3,927	3,628	3,170	2,660	2,290	2,020	1,750	11	-14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	6.0	15.6	23.6	27.0	26.8	24.0	21.6	20.3	19.4	18.5	45	-7
Hardware-Only ASP	5.0	5.0	3.7	3.1	2.3	2.1	1.9	1.8	1.7	1.7	-18	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	8	9	3	3	3	3	2	1	1	0	-22	-32
CPU Revenue	8	8	3	2	3	3	2	1	1	0	-23	-33
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-5	-32
Software Revenue	16	5	3	1	1	1	1	0	0	0	-47	-27
Bundled	1	1	1	0	0	0	0	0	0	0	-67	-100
Unbundled	15	4	2	1	1	1	1	0	0	0	-46	-27
Service Revenue	1	0	0	0	0	1	0	0	0	0	-27	-12
Total Factory Revenue	25	14	6	4	5	5	3	2	1	1	-34	-29
Increase over Prior Year (%)	266	-45	-53	-36	14	-2	-34	-29	-33	-41		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 58
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: North America
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,804	3,177	5,472	6,289	7,779	11,120	13,480	16,060	19,710	24,930	44	26
Unit Shipments or Seats	1,961	3,293	5,445	6,267	7,750	11,120	13,480	16,060	19,710	24,930	41	26
CPU Installed Base	4,783	7,691	12,652	17,958	24,216	32,990	43,270	54,740	68,050	84,630	50	28
Installed Seats	5,572	8,436	13,210	18,345	24,425	33,080	43,340	54,770	68,070	84,650	45	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	64.8	64.7	52.0	54.6	50.3	48.0	46.1	44.8	43.7	42.8	-6	-3
Hardware-Only ASP	26.0	25.2	18.2	16.6	14.1	11.8	10.8	10.2	9.9	9.6	-14	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	51	83	103	110	117	138	152	169	200	245	23	16
CPU Revenue	34	67	97	103	111	133	147	164	193	237	35	16
Terminal Revenue	8	3	1	2	2	1	0	0	0	0	-32	-34
Peripheral Revenue (Turnkey)	10	13	4	5	5	5	5	5	6	7	-15	8
Software Revenue	91	65	71	75	63	59	57	62	70	82	-9	6
Bundled	7	9	10	14	9	8	6	6	6	6	5	-8
Unbundled	83	57	61	60	54	51	51	56	64	76	-10	7
Service Revenue	16	28	37	48	57	59	69	81	97	121	36	16
Total Factory Revenue	158	176	210	233	237	256	278	312	367	447	11	14
Increase over Prior Year (%)	2	12	19	11	2	8	9	12	18	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 59
CAD/CAM/CAR/GIS History and Forecast Update

Application: IC Layout
Region: North America
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,203	2,374	4,502	5,504	6,533	9,530	11,730	14,100	17,410	22,120	53	28
Unit Shipments or Seats	1,203	2,374	4,502	5,504	6,533	9,530	11,730	14,100	17,410	22,120	53	28
CPU Installed Base	3,144	5,346	9,535	14,403	19,894	27,690	36,910	47,310	59,490	74,790	59	30
Installed Seats	3,144	5,346	9,535	14,403	19,894	27,690	36,910	47,310	59,490	74,790	59	30
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	62.7	62.5	51.9	54.8	50.5	48.2	46.3	44.9	43.7	42.8	-5	-3
Hardware-Only ASP	21.1	19.0	15.0	14.0	11.7	10.6	9.8	9.2	8.9	8.6	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	30	49	72	84	86	109	121	135	160	196	30	18
CPU Revenue	22	39	69	80	83	107	118	133	157	193	39	18
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	7	10	3	3	3	3	2	2	3	3	-23	4
Software Revenue	69	55	59	67	58	55	53	57	65	77	-4	6
Bundled	7	9	10	14	9	8	6	6	6	6	7	-8
Unbundled	63	46	49	53	49	47	47	52	60	72	-6	8
Service Revenue	12	18	28	39	45	51	61	72	86	107	40	19
Total Factory Revenue	111	122	159	190	189	215	235	264	311	380	14	15
Increase over Prior Year (%)	16	10	30	20	-0	14	9	13	18	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 60
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: North America
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	20	228	697	531	112	40	30	30	20	20	55	-29
Unit Shipments or Seats	177	344	670	508	83	40	30	30	20	20	-17	-25
CPU Installed Base	456	618	1,237	1,687	1,715	1,640	1,530	1,330	1,050	810	39	-14
Installed Seats	1,245	1,363	1,795	2,074	1,925	1,740	1,590	1,360	1,070	830	12	-15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	130.3	183.0	NA	94.0	90.9	86.8	83.3	79.8	76.4	73.4	-9	-4
Hardware-Only ASP	3,575.1	135.6	42.6	47.8	120.9	110.1	101.0	92.6	84.8	78.0	-57	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	18	31	30	25	13	5	3	3	2	2	-7	-34
CPU Revenue	8	25	27	22	11	4	3	2	2	1	7	-34
Terminal Revenue	8	3	1	2	2	1	0	0	0	0	-32	-34
Peripheral Revenue (Turnkey)	2	3	1	2	1	0	0	0	0	0	-20	-33
Software Revenue	11	9	11	7	1	0	0	0	0	0	-42	-33
Bundled	1	0	0	0	0	0	0	0	0	0	-38	-100
Unbundled	11	8	11	7	1	0	0	0	0	0	-43	-32
Service Revenue	4	10	9	9	6	2	2	1	1	1	9	-31
Total Factory Revenue	33	50	50	41	21	7	5	4	3	3	-11	-33
Increase over Prior Year (%)	-39	49	-0	-17	-50	-65	-26	-22	-20	-17		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 61
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: North America
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	731	1,100	1,370	1,660	2,060	2,620	NA	29
Unit Shipments or Seats	NA	NA	NA	NA	731	1,100	1,370	1,660	2,060	2,620	NA	29
CPU Installed Base	NA	NA	NA	NA	731	1,780	3,040	4,390	5,940	7,640	NA	60
Installed Seats	NA	NA	NA	NA	731	1,780	3,040	4,390	5,940	7,640	NA	60
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	23.6	21.5	19.7	18.7	18.2	17.8	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	17	24	27	31	37	47	NA	22
CPU Revenue	NA	NA	NA	NA	16	22	25	29	34	43	NA	22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	2	2	3	3	4	NA	22
Software Revenue	NA	NA	NA	NA	3	3	3	4	4	5	NA	11
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	3	3	3	4	4	5	NA	11
Service Revenue	NA	NA	NA	NA	5	6	7	8	10	13	NA	19
Total Factory Revenue	NA	NA	NA	NA	25	32	37	43	51	64	NA	20
Increase over Prior Year (%)	NA	NA	NA	NA	NA	26	15	16	20	25		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 62
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: North America
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	581	575	273	254	403	440	350	270	210	160	-9	-17
Unit Shipments or Seats	581	575	273	254	403	440	350	270	210	160	-9	-17
CPU Installed Base	1,183	1,727	1,880	1,868	1,875	1,860	1,800	1,710	1,580	1,390	12	-6
Installed Seats	1,183	1,727	1,880	1,868	1,875	1,860	1,800	1,710	1,580	1,390	12	-6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	32.7	25.8	49.0	24.7	24.7	22.2	20.0	18.8	17.9	17.2	-7	-7
Hardware-Only ASP	5.0	5.3	3.5	3.1	2.3	2.1	1.9	1.8	1.7	1.7	-18	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	1	1	1	1	1	1	0	0	-25	-23
CPU Revenue	3	3	1	1	1	1	1	0	0	0	-26	-23
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-4	-21
Software Revenue	10	2	1	1	1	1	1	0	0	0	-45	-36
Bundled	0	0	0	0	0	0	0	0	0	0	-51	-100
Unbundled	10	2	1	1	1	1	1	0	0	0	-45	-36
Service Revenue	1	0	0	0	0	0	0	0	0	0	-39	-24
Total Factory Revenue	14	5	2	2	2	2	1	1	1	0	-38	-28
Increase over Prior Year (%)	190	-62	-60	-17	15	-1	-29	-38	-36	-32		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 63
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Europe
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,231	1,863	2,799	2,972	3,647	4,190	6,130	8,260	10,470	12,330	31	28
Unit Shipments or Seats	1,290	1,970	2,744	2,932	3,601	4,190	6,130	8,260	10,470	12,330	29	28
CPU Installed Base	1,896	3,706	6,359	8,948	11,876	14,910	19,440	25,530	33,060	41,720	58	29
Installed Seats	2,045	3,956	6,550	9,089	11,948	14,950	19,440	25,500	33,040	41,710	55	28
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	30.1	60.1	53.0	54.9	52.1	49.7	47.7	46.3	45.1	44.1	15	-3
Hardware-Only ASP	24.5	27.4	19.4	20.5	17.8	14.0	12.6	11.6	11.1	10.7	-8	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	27	54	55	63	67	62	80	100	119	135	25	15
CPU Revenue	19	45	52	59	63	59	78	96	116	131	34	16
Terminal Revenue	3	2	1	1	1	0	0	0	0	0	-27	-60
Peripheral Revenue (Turnkey)	5	6	2	2	3	2	3	3	3	3	-12	3
Software Revenue	37	31	30	31	34	34	36	38	41	44	-2	5
Bundled	5	5	5	6	7	7	8	8	8	7	7	1
Unbundled	31	26	25	25	27	27	28	30	33	37	-4	6
Service Revenue	8	18	18	26	33	31	36	42	49	56	41	11
Total Factory Revenue	73	103	103	120	134	127	153	180	209	235	17	12
Increase over Prior Year (%)	73	41	1	16	12	-5	20	18	16	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 64
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Europe
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	424	1,258	2,352	2,646	3,237	3,860	5,710	7,760	9,900	11,680	66	29
Unit Shipments or Seats	424	1,258	2,352	2,646	3,237	3,860	5,710	7,760	9,900	11,680	66	29
CPU Installed Base	938	2,154	4,419	6,855	9,677	12,780	17,290	23,270	30,630	39,110	79	32
Installed Seats	938	2,154	4,419	6,855	9,677	12,780	17,290	23,270	30,630	39,110	79	32
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	77.6	69.8	54.4	54.9	52.1	49.7	47.7	46.3	45.1	44.1	-9	-3
Hardware-Only ASP	21.7	19.1	14.4	16.1	13.3	12.0	11.0	10.4	10.0	9.7	-12	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	13	28	35	45	46	50	67	84	103	116	38	20
CPU Revenue	9	23	34	44	45	48	65	82	100	114	50	21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	5	1	1	2	2	2	2	2	2	-21	8
Software Revenue	29	27	26	29	32	33	34	36	38	42	3	5
Bundled	5	5	5	6	7	7	8	8	8	7	8	1
Unbundled	24	22	22	23	25	25	26	28	31	34	2	6
Service Revenue	6	10	13	20	25	27	32	37	43	49	44	14
Total Factory Revenue	47	65	75	94	104	109	133	157	184	207	22	15
Increase over Prior Year (%)	91	37	15	26	11	5	21	18	17	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 65**CAD/CAM/CAE/GIS History and Forecast Update**

Application: IC Layout
 Region: Europe
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	15	116	368	304	95	10	10	10	10	0	58	-100
Unit Shipments or Seats	74	223	314	264	49	10	10	10	10	0	-10	-100
CPU Installed Base	119	231	591	877	951	920	860	740	580	430	68	-15
Installed Seats	269	481	782	1,018	1,023	950	860	710	550	420	40	-16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	236.1	244.7	NA	157.9	90.9	31.7	24.4	.0	.0	.0	-21	-100
Hardware-Only ASP	1,247.5	200.9	51.5	57.5	114.1	104.4	93.7	88.8	78.0	74.9	-45	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	12	23	19	17	11	1	1	1	0	0	-2	-53
CPU Revenue	7	20	17	15	9	1	1	1	0	0	5	-52
Terminal Revenue	3	2	1	1	1	0	0	0	0	0	-27	-60
Peripheral Revenue (Turnkey)	1	2	1	1	1	0	0	0	0	0	-4	-100
Software Revenue	7	3	2	2	1	0	0	0	0	0	-47	-8
Bundled	0	0	0	0	0	0	0	0	0	0	-34	-100
Unbundled	6	3	2	2	0	0	0	0	0	0	-48	-7
Service Revenue	2	8	5	6	5	1	1	1	1	1	19	-27
Total Factory Revenue	20	35	27	25	16	2	2	2	2	2	-6	-38
Increase over Prior Year (%)	26	69	-22	-5	-38	-87	-11	-1	-9	-12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 66
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Europe
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	269	320	420	500	570	640	NA	19
Unit Shipments or Seats	NA	NA	NA	NA	269	320	420	500	570	640	NA	19
CPU Installed Base	NA	NA	NA	NA	269	580	960	1,350	1,760	2,110	NA	51
Installed Seats	NA	NA	NA	NA	269	580	960	1,350	1,760	2,110	NA	51
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	36.5	33.6	30.8	29.3	28.5	28.0	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	10	11	13	15	16	18	NA	13
CPU Revenue	NA	NA	NA	NA	9	10	12	14	15	17	NA	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	1	1	1	1	1	NA	12
Software Revenue	NA	NA	NA	NA	1	1	1	2	2	2	NA	17
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	1	1	1	2	2	2	NA	17
Service Revenue	NA	NA	NA	NA	3	3	4	5	5	6	NA	12
Total Factory Revenue	NA	NA	NA	NA	14	15	18	21	24	26	NA	13
Increase over Prior Year (%)	NA	NA	NA	NA	NA	7	20	15	13	11		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 67
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
Region: Europe
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	792	488	78	23	46	0	0	0	0	0	-51	-100
Unit Shipments or Seats	792	488	78	23	46	0	0	0	0	0	-51	-100
CPU Installed Base	839	1,322	1,349	1,217	977	640	340	170	100	70	4	-41
Installed Seats	839	1,322	1,349	1,217	977	640	340	170	100	70	4	-41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	2.8	6.5	33.7	25.0	25.0	.0	.0	.0	.0	.0	73	-100
Hardware-Only ASP	5.0	4.6	3.7	3.2	2.2	.0	.0	.0	.0	.0	-19	-100
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	2	0	0	0	0	0	0	0	0	-57	-100
CPU Revenue	3	2	0	0	0	0	0	0	0	0	-57	-100
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	NA	0	0	0	0	0	0	0	0	-36	-100
Software Revenue	2	1	1	0	0	0	0	0	0	0	-45	0
Bundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	2	1	1	0	0	0	0	0	0	0	-43	0
Service Revenue	0	NA	0	0	0	0	0	0	0	0	-56	43
Total Factory Revenue	5	3	2	0	0	0	0	0	0	0	-52	-5
Increase over Prior Year (%)	296	-37	-42	-88	27	32	-24	-11	-8	-4		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 68
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Asia
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,069	1,270	1,804	2,940	3,567	6,070	8,210	10,820	13,820	17,160	35	37
Unit Shipments or Seats	1,214	1,290	1,913	2,948	3,572	6,090	8,230	10,830	13,840	17,170	31	37
CPU Installed Base	1,819	3,037	4,696	7,329	10,310	15,500	22,370	31,220	42,230	55,110	54	40
Installed Seats	2,328	3,545	5,276	7,840	10,750	15,870	22,660	31,460	42,410	55,260	47	39
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	148.2	108.4	88.4	62.0	61.8	57.4	56.4	54.7	53.8	53.5	-20	-3
Hardware-Only ASP	29.7	22.5	18.0	17.6	15.7	13.8	12.6	11.9	11.4	11.1	-15	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	57	49	52	73	77	100	119	141	169	199	8	21
CPU Revenue	39	34	45	66	70	94	113	135	163	193	16	23
Terminal Revenue	10	1	1	0	0	0	0	0	0	0	-57	-22
Peripheral Revenue (Turnkey)	8	13	7	7	7	6	6	6	6	6	-4	-3
Software Revenue	38	62	67	78	99	112	130	153	173	188	27	14
Bundled	23	21	21	18	16	12	12	11	10	9	-9	-12
Unbundled	14	41	46	61	83	100	118	142	163	180	55	17
Service Revenue	9	17	18	19	24	32	41	51	61	72	28	25
Total Factory Revenue	104	128	137	170	199	244	289	345	404	460	18	18
Increase over Prior Year (%)	44	23	7	25	17	23	19	19	17	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 69
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Asia
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	703	863	1,492	2,634	3,176	5,550	7,580	10,030	12,860	15,990	46	38
Unit Shipments or Seats	703	863	1,492	2,634	3,176	5,550	7,580	10,030	12,860	15,990	46	38
CPU Installed Base	1,259	2,080	3,461	5,887	8,655	13,550	20,060	28,440	38,850	51,080	62	43
Installed Seats	1,259	2,080	3,461	5,887	8,655	13,550	20,060	28,440	38,850	51,080	62	43
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	129.6	148.1	82.9	62.4	63.5	60.6	58.1	56.4	55.0	53.7	-16	-3
Hardware-Only ASP	24.4	19.6	14.4	15.9	14.1	12.8	11.7	11.0	10.6	10.3	-13	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	29	39	35	59	60	83	101	122	147	173	21	23
CPU Revenue	24	27	31	53	55	78	96	117	142	168	23	25
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	12	4	6	5	5	5	5	5	5	6	-2
Software Revenue	29	52	58	70	90	106	122	144	163	177	33	14
Bundled	19	21	18	16	15	11	11	11	10	8	-6	-11
Unbundled	10	32	41	54	75	94	111	133	153	168	67	17
Service Revenue	6	14	14	16	20	28	36	45	55	64	36	26
Total Factory Revenue	63	106	107	145	171	217	259	310	364	414	28	19
Increase over Prior Year (%)	41	67	2	35	18	27	20	20	17	14		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 70
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Asia
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	55	68	181	241	121	80	80	60	50	40	22	-20
Unit Shipments or Seats	199	89	290	248	126	80	80	60	50	40	-11	-20
CPU Installed Base	241	301	465	671	750	790	800	780	710	620	33	-4
Installed Seats	750	809	1,045	1,183	1,191	1,160	1,090	1,020	900	780	12	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	478.2	216.0	598.6	83.6	76.9	72.7	69.8	66.8	64.0	61.3	-37	-4
Hardware-Only ASP	959.6	95.1	43.6	40.1	123.7	109.5	102.3	92.6	84.8	77.9	-40	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	26	7	15	12	9	5	5	4	3	2	-23	-25
CPU Revenue	13	5	12	11	8	5	4	3	2	2	-12	-25
Terminal Revenue	10	1	1	0	0	0	0	0	0	0	-57	-22
Peripheral Revenue (Turnkey)	4	1	2	1	1	1	1	0	0	0	-26	-27
Software Revenue	5	8	8	8	3	2	2	1	1	1	-13	-19
Bundled	4	0	3	1	1	1	1	1	0	0	-27	-22
Unbundled	1	8	5	6	2	1	1	1	1	1	8	-17
Service Revenue	3	3	4	3	2	2	2	1	1	1	-6	-14
Total Factory Revenue	35	17	27	23	15	9	8	6	5	4	-20	-22
Increase over Prior Year (%)	30	-50	56	-14	-37	-39	-10	-19	-20	-16		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 71
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Asia
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	184	360	510	690	890	1,120	NA	44
Unit Shipments or Seats	NA	NA	NA	NA	184	360	510	690	890	1,120	NA	44
CPU Installed Base	NA	NA	NA	NA	184	540	1,010	1,600	2,320	3,120	NA	76
Installed Seats	NA	NA	NA	NA	184	540	1,010	1,600	2,320	3,120	NA	76
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	28.0	25.5	23.4	22.3	21.6	21.2	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	5	9	12	15	19	24	NA	36
CPU Revenue	NA	NA	NA	NA	5	9	11	15	19	23	NA	36
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	1	1	1	NA	35
Software Revenue	NA	NA	NA	NA	5	5	6	8	9	11	NA	15
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	5	5	6	8	9	11	NA	15
Service Revenue	NA	NA	NA	NA	1	2	3	4	5	7	NA	41
Total Factory Revenue	NA	NA	NA	NA	12	16	21	27	34	41	NA	29
Increase over Prior Year (%)	NA	NA	NA	NA	NA	42	30	29	24	21		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 72
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Asia
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	311	339	132	65	87	80	50	40	30	10	-27	-35
Unit Shipments or Seats	311	339	132	65	87	90	60	60	40	20	-27	-26
CPU Installed Base	318	656	770	770	721	630	500	410	340	290	23	-17
Installed Seats	318	656	770	770	721	630	500	410	340	290	23	-17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	15.1	18.3	20.1	27.2	27.0	24.1	21.6	20.3	19.3	18.9	16	-7
Hardware-Only ASP	5.0	5.1	4.4	NA	2.2	.0	.0	.0	.0	.0	-19	-100
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	3	2	2	2	2	1	1	1	0	3	-39
CPU Revenue	2	3	2	2	2	2	1	1	0	0	3	-39
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	0	-39
Software Revenue	4	2	0	0	0	0	0	0	0	0	-54	-100
Bundled	1	1	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	3	1	0	0	0	0	0	0	0	0	-52	-100
Service Revenue	0	0	0	0	0	0	0	0	0	0	0	-20
Total Factory Revenue	6	5	2	2	2	2	1	1	1	0	-20	-37
Increase over Prior Year (%)	651	-11	-53	-11	12	-8	-42	-22	-36	-63		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 73
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Rest of World
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	68	74	103	177	210	220	260	320	380	450	33	16
Unit Shipments or Seats	72	84	105	177	210	220	260	320	380	450	31	16
CPU Installed Base	160	229	320	468	634	780	970	1,170	1,410	1,670	41	21
Installed Seats	163	242	333	481	646	790	970	1,180	1,410	1,670	41	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	60.7	86.8	47.5	31.7	39.2	46.5	22.7	21.7	21.3	21.3	-10	-11
Hardware-Only ASP	35.1	37.5	17.2	19.1	14.8	11.6	10.5	9.8	9.3	8.9	-19	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	3	2	3	3	3	3	3	4	4	6	5
CPU Revenue	2	2	2	3	3	2	3	3	3	4	10	6
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-23	-14
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-8	0
Software Revenue	0	0	1	0	0	0	1	2	3	7	-16	98
Bundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	0	0	1	0	0	0	1	2	3	7	-11	98
Service Revenue	0	1	1	1	1	1	1	1	2	3	50	26
Total Factory Revenue	3	4	3	4	4	4	5	6	9	14	8	26
Increase over Prior Year (%)	-58	34	-20	31	-1	-10	21	32	44	56		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 74
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Rest of World
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	9	45	85	155	178	190	230	270	330	390	113	17
Unit Shipments or Seats	9	45	85	155	178	190	230	270	330	390	113	17
CPU Installed Base	81	121	198	336	491	630	810	1,000	1,210	1,440	57	24
Installed Seats	81	121	198	336	491	630	810	1,000	1,210	1,440	57	24
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.9	77.4	38.3	35.1	41.7	39.8	38.2	37.0	36.1	35.3	-6	-3
Hardware-Only ASP	33.6	19.4	6.7	12.7	9.8	8.9	8.2	7.7	7.4	7.2	-27	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	1	1	2	2	2	2	2	2	3	53	10
CPU Revenue	0	1	1	2	2	2	2	2	2	3	57	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-7	11
Software Revenue	0	0	1	0	0	0	1	2	3	7	0	100
Bundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	0	0	1	0	0	0	1	2	3	7	15	100
Service Revenue	0	0	0	0	0	0	1	1	1	2	68	43
Total Factory Revenue	1	1	2	3	2	3	3	5	7	12	42	38
Increase over Prior Year (%)	-79	155	9	56	-7	9	29	41	54	66		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 75
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Rest of World
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4	4	14	21	7	0	0	0	0	10	13	7
Unit Shipments or Seats	8	15	16	22	7	0	0	0	0	0	-4	-100
CPU Installed Base	24	27	41	59	63	60	60	60	50	50	28	-5
Installed Seats	27	40	53	72	75	70	70	60	50	50	30	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	187.5	208.3	529.4	NA	.0	.0	.0	.0	.0	.0	-100	NA
Hardware-Only ASP	452.5	441.3	78.4	65.1	125.0	113.8	104.5	95.8	87.7	80.7	-28	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	1	1	1	0	0	0	0	0	-17	-15
CPU Revenue	1	1	1	1	1	0	0	0	0	0	-16	-14
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-23	-14
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-16	-17
Software Revenue	0	0	0	0	0	0	0	0	0	0	-50	0
Bundled	0	NA	NA	NA	0	0	0	0	0	0	-100	NA
Unbundled	0	0	0	0	0	0	0	0	0	0	-49	0
Service Revenue	0	1	0	0	0	0	0	0	0	0	26	-9
Total Factory Revenue	2	2	2	2	1	1	1	1	1	1	-13	-13
Increase over Prior Year (%)	-53	14	-37	13	-31	-52	2	2	2	2		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 76
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Rest of World
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	26	30	30	40	50	60	NA	19
Unit Shipments or Seats	NA	NA	NA	NA	26	30	30	40	50	60	NA	19
CPU Installed Base	NA	NA	NA	NA	26	50	80	110	140	180	NA	48
Installed Seats	NA	NA	NA	NA	26	50	80	110	140	180	NA	48
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	19.2	17.5	16.0	15.2	14.8	14.5	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	0	0	1	1	1	1	NA	11
CPU Revenue	NA	NA	NA	NA	0	0	1	1	1	1	NA	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	0	NA	8
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	13
Total Factory Revenue	NA	NA	NA	NA	1	1	1	1	1	1	NA	11
Increase over Prior Year (%)	NA	NA	NA	NA	NA	-1	9	16	16	18		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 77
CAD/CAM/CAE/GIS History and Forecast Update

Application: IC Layout
 Region: Rest of World
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	55	25	4	NA	0	0	0	0	0	0	-100	NA
Unit Shipments or Seats	55	25	4	NA	0	0	0	0	0	0	-100	NA
CPU Installed Base	55	80	82	72	54	30	20	10	0	0	-0	-100
Installed Seats	55	80	82	72	54	30	20	10	0	0	-0	-100
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	25.1	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	4.9	6.0	5.5	NA	.0	.0	.0	.0	.0	.0	-100	NA
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	0	0	NA	0	0	0	0	0	0	-100	NA
CPU Revenue	0	0	0	NA	0	0	0	0	0	0	-100	NA
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	NA	0	0	0	0	0	0	NA	NA
Software Revenue	0	0	0	NA	0	0	0	0	0	0	-100	NA
Bundled	NA	NA	0	NA	0	0	0	0	0	0	NA	NA
Unbundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Service Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Total Factory Revenue	0	0	0	NA	0	0	0	0	0	0	-100	NA
Increase over Prior Year (%)	NA	-49	-44	-100	NA	NA	0	0	0	0		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 78
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	21,096	29,252	25,765	28,283	34,534	35,520	38,980	45,140	51,540	58,990	13	11
Unit Shipments or Seats	22,947	30,614	27,677	30,156	36,368	37,110	40,290	46,080	52,160	59,320	12	10
CPU Installed Base	38,701	66,470	88,404	108,327	128,941	145,380	161,830	181,760	204,700	232,010	35	12
Installed Seats	45,080	73,879	97,212	118,250	139,648	156,450	172,880	192,440	214,550	240,750	33	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.2	80.9	55.9	56.8	50.1	47.7	49.4	51.8	54.9	57.0	-9	3
Hardware-Only ASP	11.2	10.6	16.7	15.5	12.4	11.9	11.5	11.1	10.9	10.8	3	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	427	538	574	587	573	544	555	609	674	745	8	5
CPU Revenue	292	412	466	480	444	424	448	505	572	649	11	8
Terminal Revenue	69	40	44	43	41	38	32	25	17	10	-12	-25
Peripheral Revenue (Turnkey)	66	87	64	64	88	82	75	79	85	87	7	-0
Software Revenue	267	295	304	328	328	338	348	382	425	466	5	7
Bundled	125	151	181	179	136	121	105	105	108	107	2	-5
Unbundled	142	145	124	149	192	217	243	277	317	360	8	13
Service Revenue	110	133	146	176	186	204	236	276	321	373	14	15
Total Factory Revenue	804	967	1,025	1,091	1,087	1,086	1,139	1,267	1,420	1,585	8	8
Increase over Prior Year (%)	24	20	6	6	-0	-0	5	11	12	12		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 79

CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,809	6,640	12,671	13,933	15,286	17,260	22,320	29,520	37,450	46,450	42	25
Unit Shipments or Seats	3,809	6,640	12,671	13,933	15,286	17,260	22,320	29,520	37,450	46,450	42	25
CPU Installed Base	9,160	15,339	27,109	39,273	51,559	64,010	79,400	99,640	124,460	156,000	54	25
Installed Seats	9,160	15,339	27,109	39,273	51,559	64,010	79,400	99,640	124,460	156,000	54	25
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	93.8	79.5	62.2	61.0	64.0	62.6	60.7	60.0	59.8	59.3	-9	-2
Hardware-Only ASP	23.9	20.6	15.2	15.4	13.0	11.7	10.9	10.3	9.9	9.6	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	179	245	316	333	319	310	338	403	477	552	16	12
CPU Revenue	138	188	269	288	255	249	280	339	406	479	17	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	41	57	48	45	65	61	58	64	71	73	12	3
Software Revenue	154	193	231	257	261	273	288	328	376	423	14	10
Bundled	88	111	158	155	115	103	91	94	99	100	7	-3
Unbundled	66	82	73	102	146	170	197	234	276	323	22	17
Service Revenue	59	78	95	125	129	145	174	212	255	302	22	19
Total Factory Revenue	391	516	642	715	709	728	801	943	1,108	1,277	16	12
Increase over Prior Year (%)	41	32	24	11	-1	3	10	18	18	15		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 80
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	380	579	1,499	1,476	812	760	650	530	400	260	21	-20
Unit Shipments or Seats	2,232	1,941	3,412	3,350	2,646	2,340	1,960	1,480	1,010	590	4	-26
CPU Installed Base	2,158	2,585	3,865	5,022	5,449	5,780	5,920	5,780	5,320	4,700	26	-3
Installed Seats	8,537	9,995	12,672	14,944	16,156	16,850	16,970	16,460	15,170	13,440	17	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	338.7	463.2	469.7	174.7	140.7	130.0	135.2	121.7	100.4	78.9	-20	-11
Hardware-Only ASP	1,608.3	264.8	102.6	116.9	185.2	170.8	157.2	143.9	132.3	121.4	-42	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	165	171	183	173	123	109	91	69	47	27	-7	-26
CPU Revenue	75	111	126	119	75	66	54	41	28	16	0	-27
Terminal Revenue	69	40	44	43	41	38	32	25	17	10	-12	-25
Peripheral Revenue (Turnkey)	21	20	13	11	7	6	4	3	2	1	-25	-28
Software Revenue	46	46	26	23	15	11	8	6	4	2	-24	-32
Bundled	29	36	20	19	14	10	8	5	3	2	-17	-34
Unbundled	17	10	6	4	1	1	1	1	1	0	-47	-18
Service Revenue	43	46	44	43	33	31	27	20	14	8	-6	-25
Total Factory Revenue	254	262	253	239	171	151	126	95	64	37	-9	-26
Increase over Prior Year (%)	-5	3	-3	-6	-28	-11	-17	-25	-33	-42		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 81
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	1,032	1,410	2,210	3,220	4,210	5,220	NA	38
Unit Shipments or Seats	NA	NA	NA	NA	1,032	1,410	2,210	3,220	4,210	5,220	NA	38
CPU Installed Base	NA	NA	NA	NA	1,032	2,380	4,440	7,210	10,670	14,410	NA	69
Installed Seats	NA	NA	NA	NA	1,032	2,380	4,440	7,210	10,670	14,410	NA	69
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	97.2	89.4	80.7	73.9	68.4	63.7	NA	-8
Hardware-Only ASP	NA	NA	NA	NA	36.8	32.3	29.2	27.5	26.8	26.7	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	40	48	67	91	116	142	NA	29
CPU Revenue	NA	NA	NA	NA	36	44	62	84	107	132	NA	29
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	4	4	6	7	9	10	NA	24
Software Revenue	NA	NA	NA	NA	3	4	4	5	5	6	NA	14
Bundled	NA	NA	NA	NA	3	3	4	4	5	5	NA	13
Unbundled	NA	NA	NA	NA	0	0	0	1	1	1	NA	20
Service Revenue	NA	NA	NA	NA	14	17	25	34	44	56	NA	33
Total Factory Revenue	NA	NA	NA	NA	57	68	96	130	165	204	NA	29
Increase over Prior Year (%)	NA	NA	NA	NA	NA	21	40	36	27	23		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 82
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	16,906	22,033	11,594	12,873	17,404	16,090	13,800	11,860	9,490	7,060	1	-17
Unit Shipments or Seats	16,906	22,033	11,594	12,873	17,404	16,090	13,800	11,860	9,490	7,060	1	-17
CPU Installed Base	27,383	48,545	57,430	64,033	70,901	73,210	72,080	69,130	64,250	56,910	27	-4
Installed Seats	27,383	48,545	57,430	64,033	70,901	73,210	72,080	69,130	64,250	56,910	27	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.0	10.7	12.3	16.1	11.2	10.6	9.0	8.4	8.0	7.7	0	-7
Hardware-Only ASP	4.6	5.4	5.4	5.3	4.5	4.1	3.8	3.6	3.5	3.3	-1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	84	123	75	81	91	77	58	46	34	24	2	-23
CPU Revenue	79	112	71	73	78	66	51	41	31	22	-0	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	11	4	8	13	11	7	5	3	2	32	-30
Software Revenue	67	57	47	48	49	50	47	44	40	36	-7	-6
Bundled	8	4	3	4	4	4	3	2	1	0	-13	-38
Unbundled	59	53	44	44	44	46	44	42	39	35	-7	-5
Service Revenue	9	9	8	8	11	11	10	9	8	7	6	-9
Total Factory Revenue	159	189	130	137	150	138	115	99	83	67	-1	-15
Increase over Prior Year (%)	53	19	-31	6	10	-8	-17	-14	-17	-20		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 83
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	8,857	14,686	10,621	11,407	13,761	15,140	15,700	16,350	16,930	17,670	12	5
Unit Shipments or Seats	9,698	15,070	11,315	12,323	14,652	16,010	16,370	16,760	17,150	17,760	11	4
CPU Installed Base	17,893	31,733	40,372	47,752	54,897	61,190	66,890	72,320	77,370	82,070	32	8
Installed Seats	21,155	35,076	44,002	51,815	59,303	65,980	71,800	77,120	81,790	85,910	29	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	75.5	89.4	60.4	56.3	50.6	44.4	41.6	39.9	38.9	38.0	-10	-6
Hardware-Only ASP	9.5	9.3	16.1	15.7	12.4	12.2	12.0	11.8	11.8	11.8	7	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	128	191	196	204	193	197	199	203	208	215	11	2
CPU Revenue	88	158	163	168	157	162	169	178	188	198	15	5
Terminal Revenue	24	9	18	22	21	21	17	11	6	2	-4	-35
Peripheral Revenue (Turnkey)	16	24	16	14	15	14	14	14	14	15	-1	-0
Software Revenue	75	94	85	98	90	87	89	99	110	126	5	7
Bundled	22	36	38	41	26	17	16	14	12	10	4	-17
Unbundled	52	58	47	57	64	70	73	84	99	116	5	13
Service Revenue	38	46	54	71	75	87	101	117	134	151	18	15
Total Factory Revenue	241	331	335	373	357	370	390	419	452	491	10	7
Increase over Prior Year (%)	2	37	1	12	-4	4	5	7	8	9		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 84
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,327	2,599	4,810	5,471	6,099	7,160	8,620	10,210	11,690	13,210	46	17
Unit Shipments or Seats	1,327	2,599	4,810	5,471	6,099	7,160	8,620	10,210	11,690	13,210	46	17
CPU Installed Base	4,010	6,380	10,727	15,432	20,229	25,460	31,430	37,960	44,710	52,060	50	21
Installed Seats	4,010	6,380	10,727	15,432	20,229	25,460	31,430	37,960	44,710	52,060	50	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.4	76.5	54.5	51.5	48.2	46.0	44.1	42.8	41.8	40.8	-10	-3
Hardware-Only ASP	22.9	20.8	15.5	14.8	12.2	11.1	10.2	9.6	9.2	9.0	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	48	82	93	100	92	91	99	107	115	124	18	6
CPU Revenue	37	62	82	90	82	83	91	99	107	116	22	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	10	19	11	9	10	8	8	8	8	8	-2	-3
Software Revenue	34	57	58	75	68	65	70	81	93	110	19	10
Bundled	17	31	35	37	23	15	14	13	10	8	8	-19
Unbundled	18	26	24	38	45	50	56	68	83	102	26	18
Service Revenue	19	26	33	49	51	60	73	86	100	115	29	18
Total Factory Revenue	100	165	185	224	210	217	242	274	309	349	20	11
Increase over Prior Year (%)	5	64	12	21	-6	3	11	13	13	13		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 85

CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	74	211	753	607	267	300	250	180	100	50	38	-28
Unit Shipments or Seats	915	595	1,447	1,523	1,158	1,160	920	590	320	140	6	-34
CPU Installed Base	939	1,028	1,636	2,072	2,167	2,290	2,330	2,220	1,950	1,630	23	-6
Installed Seats	4,201	4,371	5,266	6,135	6,574	7,080	7,240	7,020	6,370	5,480	12	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	353.5	284.5	296.2	344.3	357.6	341.6	327.6	313.9	300.7	288.6	0	-4
Hardware-Only ASP	5,497.2	267.4	95.0	117.9	193.8	176.4	162.0	148.5	135.9	125.1	-57	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	49	53	76	76	53	53	41	26	14	6	2	-36
CPU Revenue	21	40	54	51	30	29	23	14	8	3	10	-36
Terminal Revenue	24	9	18	22	21	21	17	11	6	2	-4	-35
Peripheral Revenue (Turnkey)	5	4	4	4	2	2	1	1	0	0	-19	-37
Software Revenue	13	8	6	6	3	1	0	0	0	0	-30	-100
Bundled	4	4	3	4	2	1	0	0	0	0	-15	-100
Unbundled	8	4	3	2	1	0	0	0	0	0	-44	-100
Service Revenue	17	16	18	19	14	13	11	7	4	2	-5	-35
Total Factory Revenue	79	77	101	100	69	67	52	33	18	8	-3	-36
Increase over Prior Year (%)	-16	-2	30	-0	-31	-3	-22	-37	-46	-58		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 86

CAD/CAM/CAE/EDA History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	549	840	1,400	2,100	2,720	3,210	NA	42
Unit Shipments or Seats	NA	NA	NA	NA	549	840	1,400	2,100	2,720	3,210	NA	42
CPU Installed Base	NA	NA	NA	NA	549	1,350	2,660	4,510	6,770	9,080	NA	75
Installed Seats	NA	NA	NA	NA	549	1,350	2,660	4,510	6,770	9,080	NA	75
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	55.9	53.4	51.2	49.1	47.0	45.1	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	33.3	30.3	27.8	26.4	25.6	25.1	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	18	26	39	56	70	81	NA	34
CPU Revenue	NA	NA	NA	NA	17	24	36	52	65	75	NA	35
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	2	3	4	5	6	NA	33
Software Revenue	NA	NA	NA	NA	1	1	1	1	2	2	NA	29
Bundled	NA	NA	NA	NA	1	1	1	1	2	2	NA	29
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	7	10	15	22	28	32	NA	37
Total Factory Revenue	NA	NA	NA	NA	26	36	55	79	100	116	NA	35
Increase over Prior Year (%)	NA	NA	NA	NA	NA	41	54	42	26	16		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 87
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,456	11,877	5,058	5,329	6,845	6,840	5,430	3,870	2,400	1,210	-2	-29
Unit Shipments or Seats	7,456	11,877	5,058	5,329	6,845	6,840	5,430	3,870	2,400	1,210	-2	-29
CPU Installed Base	12,944	24,325	28,009	30,249	31,952	32,090	30,470	27,630	23,940	19,290	25	-10
Installed Seats	12,944	24,325	28,009	30,249	31,952	32,090	30,470	27,630	23,940	19,290	25	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.9	320.0	12.9	17.1	13.6	12.2	11.0	10.4	9.8	9.4	3	-7
Hardware-Only ASP	4.1	4.5	5.3	5.2	4.3	4.0	3.6	3.4	3.3	3.1	1	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	31	56	27	28	30	28	20	14	8	4	-1	-33
CPU Revenue	31	55	26	27	28	26	19	13	7	4	-2	-34
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	1	2	2	1	1	1	1	51	-23
Software Revenue	28	29	20	17	19	19	17	16	15	14	-10	-6
Bundled	1	1	0	0	0	0	0	0	0	0	-43	-5
Unbundled	26	28	20	17	18	19	17	16	15	14	-9	-6
Service Revenue	3	4	2	2	3	3	3	3	2	2	8	-13
Total Factory Revenue	61	89	49	48	52	51	40	33	26	20	-4	-18
Increase over Prior Year (%)	33	44	-45	-2	7	-3	-20	-19	-21	-24		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 88
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,493	8,798	8,511	9,293	11,315	9,370	10,270	12,420	15,210	19,670	11	12
Unit Shipments or Seats	7,867	9,162	9,196	9,831	11,864	9,750	10,590	12,660	15,360	19,740	11	11
CPU Installed Base	12,994	21,382	28,744	35,230	42,054	45,120	48,020	52,280	58,450	68,610	34	10
Installed Seats	14,173	22,934	30,962	37,904	45,099	48,220	51,130	55,280	61,160	70,970	34	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	44.4	48.2	49.6	53.3	46.1	40.3	49.9	49.0	48.1	47.1	1	0
Hardware-Only ASP	10.4	12.7	17.5	15.3	12.1	11.4	10.8	10.3	10.2	10.4	4	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	120	163	182	177	162	126	125	138	162	209	8	5
CPU Revenue	91	142	159	156	138	107	111	126	153	204	11	8
Terminal Revenue	17	8	17	14	13	10	9	7	5	3	-6	-28
Peripheral Revenue (Turnkey)	13	13	6	8	11	9	5	4	3	3	-4	-22
Software Revenue	113	95	95	99	86	87	88	91	94	102	-7	4
Bundled	38	34	45	43	25	23	16	12	9	7	-9	-24
Unbundled	75	61	50	56	60	65	72	79	85	96	-5	10
Service Revenue	43	47	57	68	67	67	77	89	103	128	12	14
Total Factory Revenue	275	305	335	344	315	281	290	318	359	439	3	7
Increase over Prior Year (%)	30	11	10	3	-9	-11	3	9	13	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 89
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Europe
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,317	2,246	3,842	3,958	4,123	3,660	5,080	7,300	10,700	16,030	33	31
Unit Shipments or Seats	1,317	2,246	3,842	3,958	4,123	3,660	5,080	7,300	10,700	16,030	33	31
CPU Installed Base	3,203	5,270	8,841	12,128	15,325	17,360	20,290	24,860	32,060	44,250	48	24
Installed Seats	3,203	5,270	8,841	12,128	15,325	17,360	20,290	24,860	32,060	44,250	48	24
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	72.1	65.1	60.8	54.1	53.2	50.8	48.7	47.3	46.2	45.0	-7	-3
Hardware-Only ASP	24.1	21.5	15.0	16.3	13.4	12.2	11.2	10.5	10.1	9.8	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	51	78	92	88	70	54	63	82	112	161	8	18
CPU Revenue	43	70	91	88	69	54	63	82	112	161	13	18
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	8	8	1	0	0	0	0	0	0	0	-58	-100
Software Revenue	72	68	70	73	63	64	65	70	77	90	-3	7
Bundled	32	28	40	38	20	17	12	9	7	6	-11	-22
Unbundled	39	39	30	36	44	47	53	61	70	84	3	14
Service Revenue	24	30	39	49	46	48	58	71	86	109	18	19
Total Factory Revenue	146	176	201	210	179	166	186	223	276	360	5	15
Increase over Prior Year (%)	13	20	15	5	-15	-7	12	20	24	30		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 90
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	62	127	493	429	228	180	180	160	120	70	39	-21
Unit Shipments or Seats	436	491	1,177	967	777	570	510	400	260	130	16	-30
CPU Installed Base	334	443	908	1,279	1,454	1,570	1,630	1,620	1,490	1,320	44	-2
Installed Seats	1,514	1,995	3,126	3,953	4,499	4,680	4,740	4,620	4,200	3,680	31	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	378.4	441.7	588.7	407.9	457.2	436.4	419.3	401.7	387.3	386.0	5	-3
Hardware-Only ASP	1,766.4	370.0	116.6	121.2	166.5	152.6	140.5	129.2	118.7	109.4	-45	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	39	46	66	58	42	32	28	23	15	8	2	-29
CPU Revenue	20	35	46	42	27	20	18	15	9	5	8	-29
Terminal Revenue	17	8	17	14	13	10	9	7	5	3	-6	-28
Peripheral Revenue (Turnkey)	3	4	3	3	2	2	1	1	1	0	-9	-32
Software Revenue	11	7	6	6	4	4	4	2	1	0	-21	-55
Bundled	4	4	4	5	4	4	4	2	1	0	4	-55
Unbundled	7	3	2	1	0	0	0	0	0	0	-69	-100
Service Revenue	14	14	16	16	13	12	11	8	5	2	-2	-28
Total Factory Revenue	64	67	88	80	59	47	42	33	21	10	-2	-30
Increase over Prior Year (%)	47	4	32	-9	-26	-20	-11	-21	-37	-52		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 91
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	282	260	330	400	550	900	NA	26
Unit Shipments or Seats	NA	NA	NA	NA	282	260	330	400	550	900	NA	26
CPU Installed Base	NA	NA	NA	NA	282	530	820	1,120	1,540	2,180	NA	51
Installed Seats	NA	NA	NA	NA	282	530	820	1,120	1,540	2,180	NA	51
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	70.3	69.4	67.8	64.3	61.8	59.7	NA	-3
Hardware-Only ASP	NA	NA	NA	NA	47.0	42.7	39.3	37.3	36.1	35.4	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	13	11	13	15	20	32	NA	19
CPU Revenue	NA	NA	NA	NA	12	10	12	14	19	30	NA	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	1	1	1	1	2	NA	18
Software Revenue	NA	NA	NA	NA	0	1	1	1	1	1	NA	13
Bundled	NA	NA	NA	NA	0	1	1	1	1	1	NA	13
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	5	5	5	6	8	13	NA	21
Total Factory Revenue	NA	NA	NA	NA	19	16	19	22	29	46	NA	20
Increase over Prior Year (%)	NA	NA	NA	NA	NA	-13	15	17	33	59		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 92

CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	6,114	6,425	4,176	4,906	6,682	5,270	4,680	4,550	3,840	2,670	2	-17
Unit Shipments or Seats	6,114	6,425	4,176	4,906	6,682	5,260	4,680	4,550	3,840	2,670	2	-17
CPU Installed Base	9,456	15,669	18,995	21,823	24,992	25,660	25,270	24,670	23,350	20,860	28	-4
Installed Seats	9,456	15,669	18,995	21,823	24,992	25,660	25,270	24,670	23,350	20,860	28	-4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	7.1	7.9	7.4	17.4	14.9	14.2	13.0	12.4	12.0	14.0	20	-1
Hardware-Only ASP	4.7	5.9	5.6	5.5	4.8	4.4	4.0	3.8	3.6	3.4	1	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	30	38	24	31	37	29	21	18	14	9	5	-24
CPU Revenue	28	37	22	26	30	22	18	16	13	9	1	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	1	1	5	7	7	3	2	1	1	46	-38
Software Revenue	30	21	19	20	17	19	19	18	15	12	-13	-8
Bundled	2	2	1	1	1	1	1	0	0	0	-19	-100
Unbundled	29	19	18	20	17	17	18	17	15	12	-13	-7
Service Revenue	5	4	3	3	4	4	4	4	3	2	-6	-9
Total Factory Revenue	65	63	45	54	58	51	43	39	33	23	-3	-17
Increase over Prior Year (%)	65	-4	-28	19	7	-12	-16	-8	-17	-29		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 93
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,380	5,482	6,240	7,090	8,755	10,140	11,770	14,620	17,000	18,430	19	16
Unit Shipments or Seats	4,973	6,061	6,713	7,421	9,060	10,390	11,990	14,820	17,180	18,590	16	15
CPU Installed Base	7,121	12,400	18,010	23,714	29,869	36,380	43,330	52,250	62,130	72,140	43	19
Installed Seats	9,002	14,837	20,838	26,687	32,835	39,180	45,940	54,650	64,340	74,200	38	18
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	118.9	118.2	57.9	58.7	51.2	50.8	51.1	54.8	58.6	60.9	-19	4
Hardware-Only ASP	17.0	11.5	17.2	15.1	13.0	11.8	11.6	11.2	10.9	10.7	-6	-4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	172	179	189	196	209	210	215	249	280	292	5	7
CPU Revenue	108	107	138	149	142	147	156	185	210	221	7	9
Terminal Revenue	27	22	8	6	5	5	5	5	4	4	-34	-3
Peripheral Revenue (Turnkey)	37	50	43	41	61	59	54	59	66	67	14	2
Software Revenue	78	104	124	129	151	161	168	190	213	229	18	9
Bundled	64	80	97	94	85	80	73	78	86	89	7	1
Unbundled	13	24	27	35	66	81	96	112	126	140	50	16
Service Revenue	29	38	33	36	42	47	53	65	77	86	10	15
Total Factory Revenue	278	321	346	360	402	419	437	504	570	607	10	9
Increase over Prior Year (%)	51	15	8	4	11	4	4	15	13	6		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 94
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,132	1,730	3,912	4,343	4,884	6,090	8,020	11,070	13,630	15,200	44	25
Unit Shipments or Seats	1,132	1,730	3,912	4,343	4,884	6,090	8,020	11,070	13,630	15,200	44	25
CPU Installed Base	1,789	3,474	7,235	11,276	15,428	20,330	26,300	34,600	44,220	54,470	71	29
Installed Seats	1,789	3,474	7,235	11,276	15,428	20,330	26,300	34,600	44,220	54,470	71	29
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	143.1	97.8	66.7	70.0	74.0	70.6	67.8	65.7	64.1	62.7	-15	-3
Hardware-Only ASP	25.3	18.2	14.9	15.7	14.1	12.7	11.7	11.0	10.6	10.3	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	79	83	129	142	156	161	170	205	237	250	19	10
CPU Revenue	57	54	94	107	101	109	121	150	175	187	15	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	22	29	35	35	55	53	50	55	62	64	25	3
Software Revenue	47	68	103	108	130	143	152	176	201	219	29	11
Bundled	39	51	83	80	72	70	65	72	82	85	17	3
Unbundled	9	17	19	28	57	73	87	105	119	134	61	18
Service Revenue	16	22	22	26	31	36	42	53	65	73	18	18
Total Factory Revenue	143	172	254	276	317	340	364	434	503	542	22	11
Increase over Prior Year (%)	194	21	47	9	15	7	7	19	16	8		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 95
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	242	237	228	412	300	260	200	170	150	140	6	-14
Unit Shipments or Seats	835	816	701	742	605	510	420	370	330	300	-8	-13
CPU Installed Base	849	1,075	1,258	1,584	1,729	1,820	1,830	1,800	1,740	1,620	19	-1
Installed Seats	2,731	3,512	4,086	4,557	4,695	4,620	4,440	4,200	3,950	3,680	15	-5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	323.7	533.8	517.3	115.5	87.4	82.8	79.3	76.2	73.0	69.7	-28	-4
Hardware-Only ASP	791.7	121.1	85.3	91.9	202.2	179.7	165.1	151.7	139.1	128.3	-29	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	72	68	37	33	24	21	17	16	14	13	-24	-12
CPU Revenue	32	34	23	24	17	14	11	10	9	8	-15	-14
Terminal Revenue	27	22	8	6	5	5	5	5	4	4	-34	-3
Peripheral Revenue (Turnkey)	13	12	5	4	2	2	1	1	1	1	-34	-21
Software Revenue	22	30	14	12	8	6	4	3	3	2	-24	-24
Bundled	21	28	12	11	7	6	4	3	2	2	-23	-27
Unbundled	2	2	1	1	0	0	0	0	0	0	-29	3
Service Revenue	11	15	9	7	6	5	5	4	4	4	-15	-8
Total Factory Revenue	105	113	59	52	38	32	26	23	20	18	-23	-13
Increase over Prior Year (%)	-12	8	-48	-12	-28	-15	-18	-12	-12	-10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 96
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	178	260	410	600	750	850	NA	37
Unit Shipments or Seats	NA	NA	NA	NA	178	260	410	600	750	850	NA	37
CPU Installed Base	NA	NA	NA	NA	178	430	810	1,330	1,940	2,520	NA	70
Installed Seats	NA	NA	NA	NA	178	430	810	1,330	1,940	2,520	NA	70
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	174.6	169.5	162.4	155.7	149.2	143.2	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	31.2	28.6	26.3	24.9	24.2	23.7	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	7	9	13	17	20	22	NA	25
CPU Revenue	NA	NA	NA	NA	6	8	11	15	18	20	NA	27
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	1	2	2	2	2	NA	10
Software Revenue	NA	NA	NA	NA	2	2	2	3	3	3	NA	8
Bundled	NA	NA	NA	NA	2	2	2	2	2	2	NA	4
Unbundled	NA	NA	NA	NA	0	0	0	1	1	1	NA	20
Service Revenue	NA	NA	NA	NA	2	2	3	5	6	7	NA	35
Total Factory Revenue	NA	NA	NA	NA	11	14	19	24	29	32	NA	24
Increase over Prior Year (%)	NA	NA	NA	NA	NA	27	34	32	19	10		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 97
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
Region: Asia
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,006	3,515	2,100	2,336	3,394	3,530	3,140	2,780	2,460	2,240	3	-8
Unit Shipments or Seats	3,006	3,515	2,100	2,336	3,394	3,530	3,150	2,790	2,470	2,240	3	-8
CPU Installed Base	4,482	7,851	9,517	10,853	12,534	13,800	14,390	14,520	14,230	13,520	29	2
Installed Seats	4,482	7,851	9,517	10,853	12,534	13,800	14,390	14,520	14,230	13,520	29	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	18.6	12.0	15.2	15.5	9.9	8.8	7.9	7.4	7.0	6.8	-15	-7
Hardware-Only ASP	6.1	7.9	5.8	5.1	4.6	4.2	3.8	3.6	3.4	3.3	-7	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	21	28	23	20	21	19	15	12	9	8	0	-18
CPU Revenue	19	18	21	18	18	16	13	10	8	7	-1	-18
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	9	2	2	3	3	2	1	1	1	9	-24
Software Revenue	8	6	8	10	12	10	10	8	6	5	10	-16
Bundled	5	1	2	3	4	3	2	1	1	0	-8	-40
Unbundled	3	5	6	6	8	8	8	7	6	5	28	-11
Service Revenue	1	1	3	3	4	4	3	3	2	2	29	-11
Total Factory Revenue	30	35	33	32	36	33	28	22	18	15	5	-17
Increase over Prior Year (%)	82	16	-6	-3	13	-10	-16	-19	-20	-19		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 98
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	367	286	392	492	703	870	1,240	1,740	2,400	3,210	18	35
Unit Shipments or Seats	409	321	453	581	792	960	1,330	1,840	2,480	3,230	18	32
CPU Installed Base	694	954	1,278	1,632	2,122	2,700	3,590	4,910	6,750	9,200	32	34
Installed Seats	750	1,032	1,410	1,844	2,411	3,060	4,020	5,390	7,260	9,670	34	32
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	33.1	74.0	59.6	53.6	39.7	65.2	68.7	67.7	64.8	61.5	5	9
Hardware-Only ASP	19.0	18.7	17.7	18.3	12.9	12.4	11.3	10.3	9.5	8.3	-9	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	7	7	8	10	10	11	15	19	24	28	7	24
CPU Revenue	5	5	6	7	7	9	12	16	21	26	8	30
Terminal Revenue	2	1	1	2	2	2	2	2	2	0	5	-32
Peripheral Revenue (Turnkey)	0	0	1	0	1	1	1	1	2	2	4	31
Software Revenue	2	2	1	1	2	2	3	3	7	10	5	37
Bundled	1	1	0	0	0	0	1	1	1	1	-9	27
Unbundled	1	1	1	1	2	2	3	2	6	8	10	39
Service Revenue	1	2	2	2	2	3	4	5	7	9	24	38
Total Factory Revenue	10	10	10	13	13	16	22	27	39	47	8	29
Increase over Prior Year (%)	-34	2	4	26	4	21	34	23	45	22		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 99
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	33	65	107	161	179	350	590	940	1,420	2,010	52	62
Unit Shipments or Seats	33	65	107	161	179	350	590	940	1,420	2,010	52	62
CPU Installed Base	158	214	306	438	577	860	1,380	2,220	3,470	5,210	38	55
Installed Seats	158	214	306	438	577	860	1,380	2,220	3,470	5,210	38	55
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	47.3	49.9	44.3	44.8	63.2	60.3	57.9	56.2	54.7	53.5	8	-3
Hardware-Only ASP	37.2	21.7	10.7	14.6	10.9	9.9	9.1	8.6	8.3	8.0	-26	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	2	2	3	2	4	6	9	12	17	18	50
CPU Revenue	1	2	1	2	2	3	5	8	11	15	19	52
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	1	1	1	2	14	41
Software Revenue	1	1	0	1	1	1	2	0	4	4	-4	52
Bundled	0	0	0	0	0	0	0	0	1	1	-11	33
Unbundled	0	0	0	0	0	1	1	0	3	3	4	62
Service Revenue	0	1	1	1	1	1	2	2	4	5	19	56
Total Factory Revenue	2	3	3	4	3	6	9	11	20	27	13	52
Increase over Prior Year (%)	-55	51	-13	46	-16	71	58	27	78	31		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 100
CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3	5	26	30	17	20	20	20	20	0	54	-100
Unit Shipments or Seats	45	39	87	118	106	110	120	120	100	20	24	-28
CPU Installed Base	36	39	63	87	99	110	120	130	140	120	29	4
Installed Seats	91	117	195	299	388	470	550	620	650	590	44	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	590.9	771.2	666.7	419.4	391.9	374.3	359.0	344.0	329.5	316.3	-10	-4
Hardware-Only ASP	2,155.4	701.3	168.3	171.7	234.9	213.9	196.3	180.0	164.8	151.6	-43	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	5	3	5	5	4	4	4	4	4	1	-3	-28
CPU Revenue	3	2	3	3	2	2	2	2	2	0	-8	-26
Terminal Revenue	2	1	1	2	2	2	2	2	2	0	5	-32
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-22	-23
Software Revenue	0	0	0	0	0	0	0	0	0	0	-14	13
Bundled	0	0	0	0	0	0	0	0	0	0	-5	15
Unbundled	0	0	0	NA	0	0	0	0	0	0	-31	0
Service Revenue	0	1	1	1	1	1	1	1	1	0	20	-22
Total Factory Revenue	5	4	6	6	5	5	6	5	5	1	-1	-25
Increase over Prior Year (%)	-38	-16	29	12	-22	0	10	-2	-13	-74		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 101

CAD/CAM/CAE/GIS History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	23	50	80	120	190	260	NA	62
Unit Shipments or Seats	NA	NA	NA	NA	23	50	80	120	190	260	NA	62
CPU Installed Base	NA	NA	NA	NA	23	70	140	250	410	630	NA	93
Installed Seats	NA	NA	NA	NA	23	70	140	250	410	630	NA	93
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	69.0	65.9	63.2	60.6	58.0	55.7	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	35.3	32.1	29.5	28.0	27.2	26.6	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	1	1	2	4	5	7	NA	54
CPU Revenue	NA	NA	NA	NA	1	1	2	3	5	7	NA	53
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	0	NA	54
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	0	1	1	2	2	3	NA	56
Total Factory Revenue	NA	NA	NA	NA	1	2	3	5	7	10	NA	54
Increase over Prior Year (%)	NA	NA	NA	NA	NA	81	56	52	46	39		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Table 102

CAD/CAM/CAE/EDA History and Forecast Update

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	330	217	259	301	483	460	540	650	780	940	10	14
Unit Shipments or Seats	330	217	259	301	483	460	540	650	780	940	10	14
CPU Installed Base	501	701	909	1,107	1,423	1,660	1,950	2,310	2,730	3,240	30	18
Installed Seats	501	701	909	1,107	1,423	1,660	1,950	2,310	2,730	3,240	30	18
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	3.3	14.6	19.8	18.0	10.9	9.8	8.8	8.3	7.9	7.6	35	-7
Hardware-Only ASP	4.7	6.3	5.3	5.3	4.7	4.3	4.0	3.7	3.6	3.4	0	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	1	2	2	2	2	2	3	3	13	6
CPU Revenue	1	1	1	2	2	2	2	2	3	3	12	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	NA	0	0	0	0	0	0	0	0	86	-13
Software Revenue	1	1	0	1	1	1	2	2	3	5	13	31
Bundled	0	NA	0	0	0	0	0	0	0	0	-12	-100
Unbundled	1	1	0	1	1	1	2	2	3	5	14	31
Service Revenue	0	0	0	0	0	0	0	0	0	1	5	40
Total Factory Revenue	2	2	2	3	4	3	4	5	6	9	13	19
Increase over Prior Year (%)	43	-1	-23	40	51	-14	18	25	32	41		

Note: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (October 1992)

Dataquest

Dataquest Research and Sales Offices:

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
United States
Phone: 01-408-437-8000
Facsimile: 01-408-437-0292

Dataquest Incorporated
Dataquest/Ledgeway
550 Cochituate Road
Framingham, Massachusetts 01701-9324
United States
Phone: 01-508-370-5555
Facsimile: 01-508-370-6262

Dataquest Incorporated Invitational
Computer Conferences Division
3151 Airway Avenue, C-2
Costa Mesa, California 92626
United States
Phone: 01-714-957-0171
Facsimile: 01-714-957-0903

Dataquest Australia
Suite 1, Century Plaza
80 Berry Street
North Sydney, NSW 2060
Australia
Phone: 61-2-959-4544
Facsimile: 61-2-929-0635

Dataquest Europe Limited
Roussel House, Broadwater Park
Denham, Uxbridge
Middlesex UB9 5HP
England
Phone: 44-895-835050
Facsimile: 44-895-835260/1

Dataquest Europe SA
Tour Galliéni 2
36, avenue du Général-de-Gaulle
93175 Bagnolet Cedex
France
Phone: 33-1-48-97-3100
Facsimile: 33-1-48-97-3400

Dataquest GmbH
Kronstadter Strasse 9
8000 Munich 80
Germany
Phone: 49-89-930-9090
Facsimile: 49-89-930-3277

Dataquest Germany
In der Schneithohl 17
6242 Kronberg 2
Germany
Phone: 49-6173/61685
Facsimile: 49-6173/67901

Dataquest Hong Kong
Rm. 4A01
HKPC Building
78 Tat Chee Avenue
Kowloon, Hong Kong
Phone: 852-788-5432
Facsimile: 852-788-5433

Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa, Chuo-ku
Tokyo, 104
Japan
Phone: 81-3-5566-0411
Facsimile: 81-3-5566-0425

Dataquest Korea
Daeheung Building 1105
648-23 Yeoksam-dong
Kangnam-gu
Seoul 135-080, Korea
Phone: 82-2-556-4166
Facsimile: 82-2-552-2661

Dataquest Singapore
4012 Ang Mo Kio Industrial Park 1
Ave. 10, #03-10 to #03-12
Singapore 2056
Phone: 65-4597181
Telex: 38257
Facsimile: 65-4563129

Dataquest Taiwan
Room 801/8th Floor
Ever Spring Building
147, Sec. 2, Chien Kuo N. Rd.
Taipei, Taiwan R.O.C. 104
Phone: 886-2-501-7960
886-2-501-5592
Facsimile: 886-2-505-4265

Dataquest Thailand
300/31 Rachdapisek Road
Bangkok 10310
Thailand
Phone: 66-2-275-1904/5
66-2-277-8850
Facsimile: 66-2-275-7005

**Electronic Design Automation
Applications
Final Market Share
September 14, 1992**

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Market Statistics

**CAD/CAM/CAE
Electronic Design Automation Applications**

CCAM-EDA-MS-9202

**Electronic Design Automation
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Final Market Share
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Market Statistics

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File behind the *Market Statistics* tab inside the
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Electronic Design Automation Applications Final Market Share

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Electronic Design Automation Applications Final Market Share

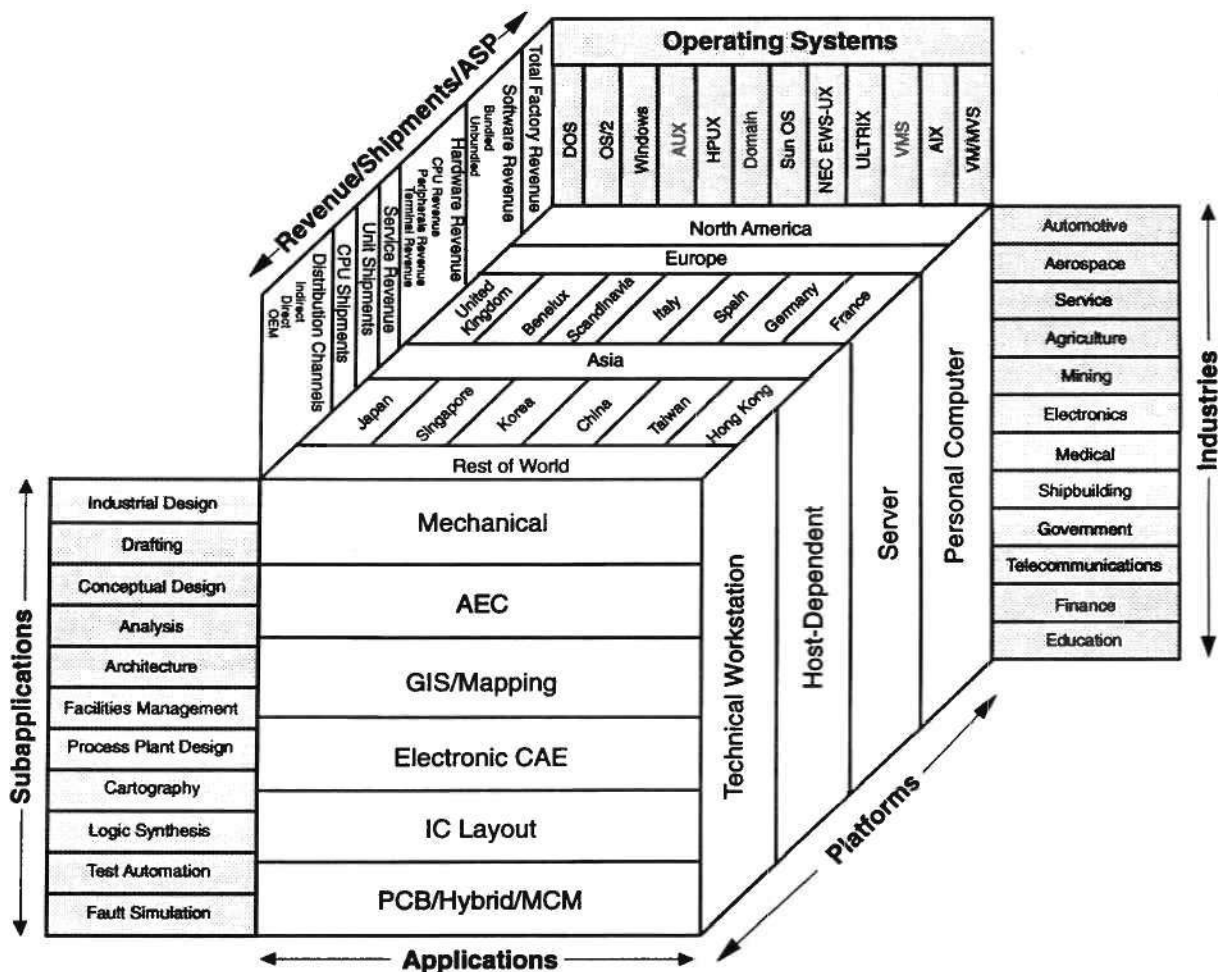
Introduction

CAD/CAM/CAE/GIS systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE/GIS systems continue

to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE/GIS industry, Dataquest's CAD/CAM/CAE/GIS group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE/GIS Market Database



Source: Dataquest (September 1992)

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Market Analysis

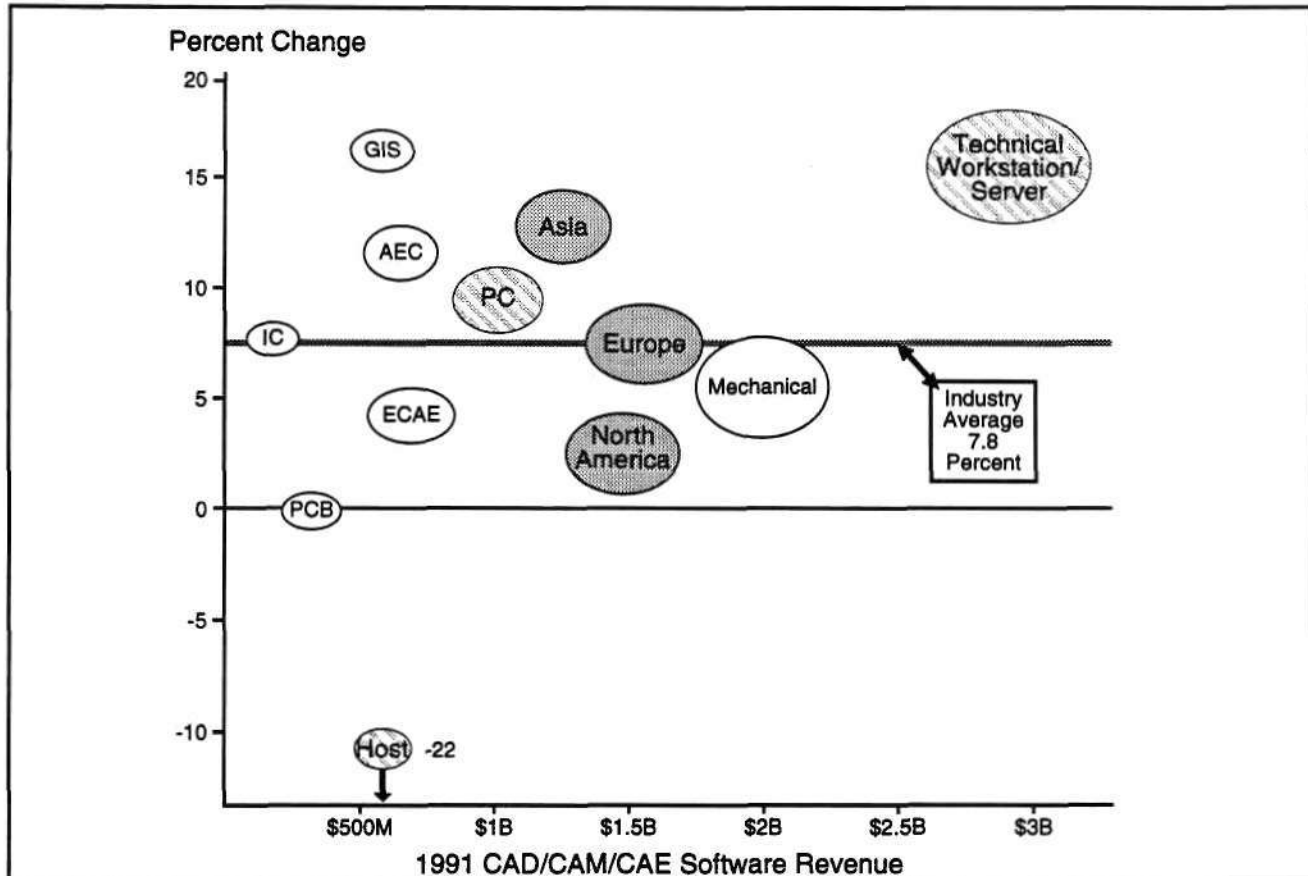
Analysis of Dataquest's final 1991 market share information shows that the entire worldwide CAD/CAM/CAE/GIS market grew at a 3.0 percent rate in 1991, to \$14.8 billion. The software market portion grew by more than 7 percent, to \$4.5 billion. Causes of the downward revision are examined in the following section.

Figure 2 depicts the market size and market growth rate of segments in the CAD/CAM/CAE/GIS software industry. In Figure 2, the size of the bubble reflects the size of the market, and the bubbles are centered over both their market size, and their market growth rate last year. For example, mechanical applications, valued at slightly more than \$2.0 billion, grew close to the industry average, at 7 percent; while the considerably smaller GIS market grew at a brisk 16.8 percent rate. Each shade

in the figure represents a different market segmentation: segments by application are clear; segments by region have light shading, and segments by platform have diagonal lines. The sum of any one type of shading equals the total \$4.5 billion software market. Corresponding to this figure, Table 1 lists market size and 1990-to-1991 growth rates by segment, for both software revenue and total revenue.

In 1991, the platform category of servers was created. Most of the revenue for servers came from what had formerly been classified as technical workstations, which depressed the apparent growth rate of technical workstations. In reality, workstations are the largest market platform, and had a better-than-average growth rate. In the illustration, workstations and servers are combined. In total, computer hardware sold into CAD/CAM/CAE/GIS remained flat with 1990 revenue.

Figure 2
CAD/CAM/CAE/GIS Market Portfolio



Source: Dataquest (September 1992)

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Table 1
CAD/CAM/CAE/GIS 1991 Market Summary

	Software Revenue 1990 (\$M)	Software Revenue 1991 (\$M)	Growth Rate (%)	Total Revenue 1990 (\$M)	Total Revenue 1991 (\$M)	Growth Rate (%)
Application						
Mechanical	1,910.5	2,040.1	6.8	7,176.5	7,238.5	0.9
AEC	589.4	659.5	11.9	2,173.6	2,330.0	7.2
GIS/Mapping	476.2	556.3	16.8	1,652.7	1,843.6	11.6
Electronic CAE	653.7	686.3	5.0	1,778.5	1,763.9	-0.8
IC Layout	184.5	195.8	6.1	527.1	574.7	9.0
PCB/Hybrid/MCM	328.0	328.3	0.1	1,089.8	1,086.1	-0.3
Total	4,142.2	4,466.3	7.8	14,398.2	14,836.8	3.0
Region						
North America	1,480.7	1,520.3	2.7	5,012.2	5,026.7	0.3
Europe	1,492.7	1,617.7	8.4	5,251.4	5,472.4	4.2
Asia	1,105.3	1,247.7	12.9	3,867.4	4,039.0	4.4
Rest of World	63.6	80.6	26.8	267.3	298.6	11.7
Total	4,142.2	4,466.3	7.8	14,398.2	14,836.8	3.0
Platform						
Technical Workstation	2,478.3	2,684.9	8.3	7,634.8	7,923.0	3.8
Host Dependent	761.8	593.1	-22.1	3,856.1	2,875.5	-25.4
Server	0	188.7	NA	0	991.1	NA
Personal Computer	902.1	999.6	10.8	2,907.3	3,047.1	4.8
Total	4,142.2	4,466.3	7.8	14,398.2	14,836.8	3.0

NA = Not applicable

Source: Dataquest (September 1992)

In contrast, Dataquest's research in our computer systems group shows that worldwide computer revenue declined 7 percent throughout the same period. So things could be worse—software was one of the few growth areas in some very tough economic times, and CAD software clearly boosted revenue for a few hardware suppliers.

About This Update

Since the preliminary market share numbers were published, eight more new companies have been added to the database, bringing the total new companies added this year to 15. The market share numbers also have been rechecked and verified for all vendors worldwide. Year-end 1991 financial results released this past spring have also been checked and incorporated into the final numbers.

The most important change affecting the market share numbers for this update was the

significant downward revision of revenue for most of the major vendors. Of the top 20 vendors listed in Table 2, 18 companies' revenue was revised downward, 10 of them significantly, based on final fourth-quarter financial results. Looking at software alone, Table 3 also portrays a primarily downward revision trend. In all cases, however, these changes have produced very small changes in any company's market position.

Two companies, Electronic Data Systems Corp. (EDS) and Computervision Corp., revealed previously unavailable information in 1992. EDS' market position was significantly lowered due to new reporting structure put in place after its purchase from McDonnell Douglas, which eliminated considerable revenue from service and consulting that has been reclassified as a separate, non-CAD activity. Computervision's revenue was also revised downward almost \$90 million based on the company's final published results in conjunction

Table 2
1991 Top Twenty CAD/CAM/CAE/GIS Vendors Total Revenue

	Preliminary Total Revenue (\$M)	Final Total Revenue (\$M)	Revenue Change (\$M)	Final Market Share (%)	Share Change (%)
IBM	1,762.0	1,712.1	-49.9	11.5	0.4
Intergraph	1,156.8	1,148.0	-8.8	7.7	0.4
Computervision	982.9	890.5	-92.4	6.0	-0.2
Hewlett-Packard	850.0	830.2	-19.8	5.6	0.2
Digital	926.7	816.1	-110.6	5.5	-0.4
Sun	679.7	674.3	-5.4	4.5	0.2
Fujitsu	491.8	442.9	-48.9	3.0	-0.1
Mentor	406.5	396.1	-10.4	2.7	0.1
Compaq	433.1	394.3	-38.8	2.7	-0.1
NEC	462.0	342.4	-119.6	2.3	-0.6
EDS	419.8	287.2	-132.6	1.9	-0.7
Autodesk	278.4	279.5	1.1	1.9	0.1
Siemens Nixdorf	309.0	267.5	-41.5	1.8	-0.2
Cadence	233.6	233.9	0.3	1.6	0.1
Apple	231.5	231.5	0.0	1.6	0.1
Nihon Unisys	245.4	210.9	-34.5	1.4	-0.1
Silicon Graphics	172.5	189.8	17.3	1.3	0.2
Hitachi	210.0	180.0	-30.0	1.2	-0.1
Control Data	160.2	176.3	16.1	1.2	0.2
Valid Logic	152.1	152.1	0.0	1.0	0.1
380 Other Companies	5,227.5	4,981.2	-246.3	33.6	0.5
All Companies	15,791.5	14,836.8	-954.7	100.0	0.0

Source: Dataquest (September 1992)

Table 3
1991 CAD/CAM/CAE/GIS Software Market

Company	Preliminary Software Revenue (\$M)	Final Software Revenue (\$M)	Revenue Change (\$M)	Final Software Share (%)	Share Change (%)
IBM	369.0	378.8	9.8	8.5	0.7
Intergraph	282.4	280.3	-2.1	6.3	0.3
Autodesk	278.4	279.5	1.1	6.3	0.4
Computervision	272.9	247.3	-25.6	5.5	-0.3
Cadence	195.2	184.3	-10.9	4.1	0.0
Mentor Graphics	170.7	146.4	-24.3	3.3	-0.3
Fujitsu	134.4	119.6	-14.8	2.7	-0.1
Valid	109.6	108.5	-1.1	2.4	0.1
SDRC	93.5	101.1	7.6	2.3	0.3
EDS	146.6	100.1	-46.5	2.2	-0.9
Siemens Nixdorf Infosysteme	109.1	94.3	-14.8	2.1	-0.2
NEC	103.5	83.4	-20.1	1.9	-0.3

(Continued)

Table 3 (Continued)
1991 CAD/CAM/CAE/GIS Software Market

Company	Preliminary Software Revenue (\$M)	Final Software Revenue (\$M)	Revenue Change (\$M)	Final Software Share (%)	Share Change (%)
ESRI	82.5	77.5	-5	1.7	0.0
Hitachi	88.2	75.6	-12.6	1.7	-0.2
Racal-Redac	67.6	70.6	3	1.6	0.2
Zuken	62.8	62.8	0	1.4	0.1
Hewlett-Packard	72.7	61.0	-11.8	1.4	-0.1
MacNeal-Schwendler	52.8	53.6	0.8	1.2	0.1
CADAM	48.3	51.3	3	1.2	0.2
Schlumberger	60.9	50.9	-10	1.1	-0.2
Parametric Technology	43.4	43.4	0	1.0	0.1
Toshiba—No OEM	51.5	40.0	-11.5	0.9	-0.2
Matra Datavision	37.6	35.8	-1.8	0.8	0.0
Wacom	32.3	32.3	0	0.7	0.0
Viewlogic Systems	30.7	32.0	1.3	0.7	0.0
PDA Engineering	24.9	30.4	5.5	0.7	0.2
Synopsys	31.4	30.1	-1.3	0.7	0.0
Sharp System Products—No OEM	29.9	29.9	0	0.7	0.1
Control Data	28.2	29.3	1.1	0.7	0.1
Swanson Analysis	28.8	28.5	-0.3	0.6	0.0
ISICAD	27.6	27.6	0.9	0.6	0.0
Nihon Unisys	31.9	27.4	-4.5	0.6	-0.1
Alias Research	27.0	27.0	0	0.6	0.0
Mutoh Industries—No OEM	31.0	26.7	-4.3	0.6	-0.1
STI-Straessle	26.1	26.1	0	0.6	0.0
Nemetschek	24.0	24.7	0.6	0.6	0.1
COMPASS Design Automation-VLSI	28.1	23.9	-4.2	0.5	-0.1
Landmark Graphics	20.7	23.2	2.5	0.5	0.1
Auto-Trol	19.6	21.3	1.7	0.5	0.1
Harris EDA	19.1	20.1	0.8	0.4	0.0
IEZ	33.7	19.8	-13.9	0.4	-0.3
Hakuto	22.0	18.9	-3.2	0.4	-0.1
EEsof	18.1	18.1	0	0.4	0.0
Cimline	17.7	18.0	0.3	0.4	0.0
PAFEC	19.4	17.9	-1.5	0.4	0.0
MCS	17.2	17.2	0	0.4	0.0
Kewill Systems	17.1	17.1	0	0.4	0.0
CADKEY	14.8	16.4	1.6	0.4	0.1
Xilinx	16.2	16.2	0	0.4	0.1
CADIX	16.1	16.1	0	0.4	0.1
Tokyo Electron—No OEM	15.1	15.1	0	0.3	0.0
170 Other Companies	1,120.6	1,072.4	-58.5	23.8	0.1
Total	4,722.9	4,466.3	-256.6	100.0	0.0

Source: Dataquest (September 1992)

with the company's recapitalization. Both Digital Equipment Corporation and NEC Electronics Inc. are significant computer suppliers in the CAD/CAM market, so our reduced revenue estimates here produced a significant dollar drop. Changes to these four companies (EDS, Computervision, Digital, and NEC) account for approximately 50 percent of our market size reduction.

Final financial results for most Asian-based and European-based companies, which are not usually available until midspring, were also overoptimistically estimated (by the companies themselves and Dataquest) in January. The worldwide economic slowdown, much of which occurred in the fourth quarter of 1991, was significantly underestimated.

On the software side, most of the changes to vendor revenue were again downward, with fewer balancing upward adjustments (see Table 3). Beyond the companies already mentioned, Mentor Graphics Corp. revenue was adjusted to reflect a lower proportion of software in 1991, based on delayed shipment of a new software release—with a resulting reductions in software revenue. Here, too, changes to our software revenue produced almost insignificant changes to any company's market share.

In addition to these changes, the CAD/CAM/CAE/GIS group significantly refined its database model for tracking sales through the OEM distribution channel. This model change affected many of the major hardware vendors' market position by application as we tried to match their hardware OEM sales going through to turnkey vendors. This model change has been adjusted for historical information also and will continue to be refined each update.

Dataquest's policy is to continually update its market information, for current and past years, with any new data received in order to arrive at the most accurate market representation possible.

Dataquest Perspective

The market dynamics in the total CAD/CAM/CAE/GIS market comprises many factors based on application-specific market needs, diverse geographical issues, and the amazing growth

of computing and graphics resources. A more detailed analysis of each application area must be made to thoroughly understand the forces driving the entire market. Dataquest will discuss these forces and will provide an in-depth analysis of CAD/CAM/CAE/GIS regional issues, technology trends, and company analyses in future publications.

About This Document

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE/GIS industry. Following is a description of the information reported in the *Market Share* book for each segment:

- Source—All companies in database; overview of industry
- Mechanical Applications—All companies in database with mechanical revenue
- AEC and GIS Applications—All companies in database with AEC or GIS revenue
- Electronic Design Automation Applications—All companies in database with EDA (electronic CAE, IC layout, PCB/hybrid/MCM) revenue
- Europe—All Europe-based companies and all other companies with more than \$1 million in European revenue
- Asia—All Asia-based companies and all other companies with more than \$1 million in Asian revenue
- Personal CAD and Distribution Channels—All companies in database with personal computer revenue

More detailed data on this market may be requested through our client inquiry service.

Segmentation

Dataquest defines CAD/CAM/CAE/GIS as systems used in the mechanical; architecture, engineering, and construction (AEC); GIS/mapping; and electronic design automation (EDA) application areas. The CAD/CAM/CAE/GIS market is defined

according to the following segmentation scheme:

- CAD/CAM/CAE/GIS
 - Mechanical
 - AEC (Architecture, Engineering, and Construction)
 - GIS/Mapping (Geographic Information Systems)
 - EDA (Electronic Design Automation)
 - Electronic CAE
 - IC Layout
 - PCB/Hybrid/MCM

In addition, more detailed information by subapplication is available and usually published in *Dataquest Perspectives*.

Definitions

This section lists the definitions that are specific to this document.

Application definitions are as follows:

- **Mechanical**—Mechanical CAD/CAM refers to computer-aided tools used to design, analyze, document, and manufacture discrete parts, components, and assemblies.
- **Architecture, Engineering, and Construction (AEC)**—This segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.
- **Geographic Information Systems (GIS)/Mapping**—This is a computer-based technology, composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.
- **Electronic Design Automation (EDA)**—This segment covers computer-based tools that are used to automate the process of designing an electronic product including printed circuit boards, ICs, and systems. EDA

includes ECAE, IC Layout, and PCB/Hybrid/MCM, as follows:

- **Electronic Computer-Aided Engineering (CAE)**—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of Electronic CAE applications are schematic capture and simulation.
- **IC Layout**—This is a software application tool that is used to create and validate the physical implementation of an integrated circuit (IC). The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- **Printed Circuit Board (PCB)/Hybrid/Multichip Module (MCM)**—This segment covers products that are used to create the placement and routing of the traces and components laid out on a printed circuit board. Also, included in this category are thermal analysis tools.

Regional definitions are as follows:

- **North America**—Includes United States and Canada
- **Europe**—Includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe
- **Asia**—Includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong
- **Rest of World**—All other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East

Platform definitions are as follows:

- **Technical Workstation**—This is a single-user computer that is distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multi-tasking operating system (UNIX, VMS, DOMAIN); the computer is designed by manufacturer to run high-performance graphic applications in a multiuser/multi-tasking environment.

- **Host-Dependent**—This is a shared logic system in which the external workstations' functions are dependent on a host computer.
 - **Server**—A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, compute capability, and others. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE/GIS applications:
 - **Compute Servers**—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
 - **Print Servers**—These systems provide access to printers, specialized printing applications software, and print spooling resources to a network.
 - **File Servers**—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
 - **Database Servers**—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.
 - **Personal Computer**—This is defined as a single-user computer that is distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.
- Revenue/shipments/ASP definitions are as follows:
- **Total factory revenue** is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue).
 - **Unit shipment** is defined as the number of products delivered (that is, seats).
 - **Software revenue** is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
 - **Service revenue** is defined as revenue derived from the service and support of CAD/CAM/CAE/GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year, we survey all major participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information). Examples of the job titles of people contacted for information are the following:

- President and CEO
- Vice President and General Manager
- Vice President of Marketing
- Vice President, Strategic Product Planning
- Director of Strategic Planning
- Director of Marketing

- Director of Market Development
- Manager, CAD/CAM/CAE/GIS Marketing Programs
- Market Research Analyst

We resurvey select companies during the second quarter of the following year to verify final annual results and then publish final market share information based on this updated information. Our annual delivery schedule is as follows:

- First Quarter (January 31)—Preliminary market data are available. All tables will be published and distributed to clients. Historical database is opened for changes for a six-month period.
- Second Quarter (March 31)—We provide complete preliminary forecast tables, including a new five-year forecast period.
- Third Quarter (July 1)—We send complete, final updated market share tables based on additional data collection and analysis over the previous six months. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on these final market data.
- Fourth Quarter (October 1)—We provide complete final forecast tables, taking into consideration changes in the market during the previous six months.

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data

- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice and checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE/GIS group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE/GIS market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

Notes on Market Share

For the 1991 market share cycle, Dataquest's CAD/CAM/CAE/GIS group added server as a platform. The platform categories now include technical workstation, host-dependent, server, and personal computer. Revenue formerly classified in technical workstations, host-dependent, or personal computer may now be more accurately classified, where appropriate, in the server category. However, because of this reclassification, data and growth rates for the other platform areas were affected.

Finally, please note that despite the care taken in gathering and analyzing the available data and in attempting to categorize those data in a meaningful way, careful attention must be paid to the definitions and assumptions used herein when interpreting the estimates presented in this document. Various companies, government

agencies, and trade associations may use slightly different definitions of product categories and regional groupings, or they may include different companies in their summaries. These differences should be kept in mind when making comparisons between these data and those provided by others.

Table 4
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	491.8	422.9	.0	28,853	14.4%	26.6%	.0%	22.8%
Mentor Graphics	396.1	113.8	146.4	3,808	11.6%	7.2%	12.1%	3.0%
Digital	295.1	198.3	5.4	2,847	8.6%	12.5%	.4%	2.3%
Cadence	233.9	.0	184.3	0	6.8%	.0%	15.2%	.0%
Hewlett-Packard	177.0	141.4	.0	20,484	5.2%	8.9%	.0%	16.2%
Valld	152.1	5.1	108.5	611	4.4%	.3%	9.0%	.5%
Intergraph	133.3	36.9	44.7	1,297	3.9%	2.3%	3.7%	1.0%
Compaq	109.0	109.0	.0	21,262	3.2%	6.9%	.0%	16.8%
Zuken	103.9	41.6	62.3	606	3.0%	2.6%	5.1%	.5%
IBM	99.9	76.7	11.5	13,970	2.9%	4.8%	1.0%	11.1%
Racal-Redac	86.0	.3	70.6	17	2.5%	.0%	5.8%	.0%
Fujitsu	75.3	51.1	16.7	1,694	2.2%	3.2%	1.4%	1.3%
NEC	58.2	38.3	15.3	4,198	1.7%	2.4%	1.3%	3.3%
Viewlogic Systems	41.0	.0	32.0	0	1.2%	.0%	2.6%	.0%
Synopsys	40.1	.0	30.1	0	1.2%	.0%	2.5%	.0%
Uchida Yoko	36.8	34.9	1.8	584	1.1%	2.2%	.2%	.5%
Wacom	36.6	7.3	25.5	603	1.1%	.5%	2.1%	.5%
Harris EDA	35.0	3.9	19.9	168	1.0%	.2%	1.6%	.1%
Sharp System Products—NO OEM	31.2	16.2	15.0	186	.9%	1.0%	1.2%	.1%
Seiko Instruments—NO OEM	30.6	13.2	14.0	188	.9%	.8%	1.2%	.1%
COMPASS Design Automation-VLSI	30.6	1.7	23.9	40	.9%	.1%	2.0%	.0%
Zycad	30.0	15.6	8.1	230	.9%	1.0%	.7%	.2%
Siemens Nixdorf Info systeme	27.8	13.8	9.7	408	.8%	.9%	.8%	.3%
Computervision	26.3	10.0	7.4	231	.8%	.6%	.6%	.2%

(Continued)

Table 4 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
CADIX	22.6	9.0	11.3	166	.7%	.6%	.9%	.1%
Autodesk	22.4	.0	22.4	0	.7%	.0%	1.9%	.0%
EEsof	20.5	.1	18.1	15	.6%	.0%	1.5%	.0%
Apple Computer	18.5	16.3	.0	3,880	.5%	1.0%	.0%	3.1%
Solbourne	18.0	17.6	.0	1,709	.5%	1.1%	.0%	1.4%
Xilinx	18.0	.0	16.2	0	.5%	.0%	1.3%	.0%
LSI Logic	17.5	1.8	13.1	44	.5%	.1%	1.1%	.0%
Teradyne	15.8	2.0	10.2	30	.5%	.1%	.8%	.0%
LPKF	15.0	9.8	3.8	650	.4%	.6%	.3%	.5%
Logic Automation	14.2	.0	14.2	0	.4%	.0%	1.2%	.0%
Quickturn Systems	14.0	14.0	.0	112	.4%	.9%	.0%	.1%
Altera	13.7	.0	11.6	0	.4%	.0%	1.0%	.0%
Ikos Systems	13.1	13.1	.0	61	.4%	.8%	.0%	.0%
CADAM	13.0	3.0	8.5	600	.4%	.2%	.7%	.5%
ACTEL	12.5	.0	11.3	0	.4%	.0%	.9%	.0%
Toshiba—NO ORN	11.6	5.8	4.6	131	.3%	.4%	.4%	.1%
Aucotec	11.3	1.9	7.3	350	.3%	.1%	.6%	.3%
Analogy	10.5	.0	9.5	0	.3%	.0%	.8%	.0%
Orcad	10.5	.0	10.5	0	.3%	.0%	.9%	.0%
Comdisco Systems	9.8	.0	8.8	0	.3%	.0%	.7%	.0%
Silvar-Lisco	9.5	.0	5.2	0	.3%	.0%	.4%	.0%
Hitachi	9.0	4.3	3.8	264	.3%	.3%	.3%	.2%
Data I/O	8.7	.0	8.7	0	.3%	.0%	.7%	.0%
PADS Software	8.7	.0	7.4	0	.3%	.0%	.6%	.0%

(Continued)

Table 4 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Microslm	8.5	.0	8.0	0	.2%	.0%	.7%	.0%
Genrad	7.7	1.5	5.1	77	.2%	.1%	.4%	.1%
Ascent Logic Corp	7.5	.0	6.0	0	.2%	.0%	.5%	.0%
Vantage Analysis Systems	7.0	.0	6.0	0	.2%	.0%	.5%	.0%
Everex Systems	7.0	7.0	.0	2,876	.2%	.4%	.0%	2.3%
Meta-Software	6.8	.0	5.9	0	.2%	.0%	.5%	.0%
Test Systems Strategies	6.2	.0	5.4	0	.2%	.0%	.4%	.0%
Cascade Design Automation	5.5	.0	3.9	0	.2%	.0%	.3%	.0%
I-Logix	5.5	.0	5.5	0	.2%	.0%	.5%	.0%
Kloeckner-Moeller	5.4	1.1	3.8	44	.2%	.1%	.3%	.0%
Ziegler Informatics	4.7	.0	4.7	0	.1%	.0%	.4%	.0%
Tokyo Electron—NO OEM	4.7	1.6	2.3	18	.1%	.1%	.2%	.0%
BETRONEX	4.6	.5	4.1	86	.1%	.0%	.3%	.1%
AnaCAD	4.5	.0	4.5	0	.1%	.0%	.4%	.0%
Dell Computer	4.3	4.3	.0	1,107	.1%	.3%	.0%	.9%
Quad Design Technology	4.3	.0	4.0	0	.1%	.0%	.3%	.0%
HP Cade	4.2	2.5	1.3	42	.1%	.2%	.1%	.0%
Sagantec	4.0	.0	3.6	0	.1%	.0%	.3%	.0%
Contec Microelectronics	4.0	.0	3.6	0	.1%	.0%	.3%	.0%
Pacific Numerics	4.0	.0	4.0	0	.1%	.0%	.3%	.0%
Ontos	3.8	.0	3.8	0	.1%	.0%	.3%	.0%
Compact Software	3.6	.0	3.6	0	.1%	.0%	.3%	.0%
Scientific & Engineering SW	3.5	.0	3.5	0	.1%	.0%	.3%	.0%
EPIC Design Technology	3.5	.0	3.1	0	.1%	.0%	.3%	.0%

(Continued)

Table 4 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sony	3.3	2.9	.0	191	.1%	.2%	.0%	.2%
Integrated Silicon Systems	3.0	.5	2.5	18	.1%	.0%	.2%	.0%
Century Research Center	2.9	1.6	1.1	18	.1%	.1%	.1%	.0%
Quantic Laboratories	2.9	.0	2.7	0	.1%	.0%	.2%	.0%
Research Machines	2.9	2.9	.0	460	.1%	.2%	.0%	.4%
Accel Technologies	2.8	.0	2.5	0	.1%	.0%	.2%	.0%
debis Systemhaus	2.8	.7	1.7	19	.1%	.0%	.1%	.0%
ALS Design	2.6	.0	2.6	0	.1%	.0%	.2%	.0%
ALDEC	2.5	.0	2.5	0	.1%	.0%	.2%	.0%
Infinite Graphics	2.5	.0	2.5	0	.1%	.0%	.2%	.0%
Motorola	2.5	.0	2.5	0	.1%	.0%	.2%	.0%
Visionics	2.4	.0	1.8	10	.1%	.0%	.2%	.0%
CAD-UL	2.1	.0	2.1	0	.1%	.0%	.2%	.0%
ISDATA	2.0	.0	1.8	0	.1%	.0%	.1%	.0%
Sumitomo Denko Wadestation	1.8	1.8	.0	100	.1%	.1%	.0%	.1%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.1%	.0%
Massteck	1.8	.0	1.8	0	.1%	.0%	.1%	.0%
SIMUCAD	1.7	.0	1.7	0	.1%	.0%	.1%	.0%
Caditron	1.6	.8	.6	25	.0%	.1%	.1%	.0%
Tanner Research	1.4	.0	1.2	0	.0%	.0%	.1%	.0%
Omron	1.4	1.2	.1	39	.0%	.1%	.0%	.0%
Electrical Eng. Software	1.3	.0	1.2	0	.0%	.0%	.1%	.0%
DECAD	1.3	.2	.8	5	.0%	.0%	.1%	.0%
National Semiconductor	1.2	.2	1.0	12	.0%	.0%	.1%	.0%

(Continued)

Table 4 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share			
					Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Aucos elektronische Gerate	1.2	.4	.8	116	.0%	.0%	.1%	.1%
Serbi	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Spectrum Software	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Cadisys	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Phase Three Logic	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Intrinsic	1.0	1.0	.0	10	.0%	.1%	.0%	.0%
Object Design	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Royal Digital Systems	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Omaton	.9	.0	.9	0	.0%	.0%	.1%	.0%
Objectivity	.9	.0	.9	0	.0%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.0%	.0%	.0%	.0%
Number One Systems	.8	.2	.6	61	.0%	.0%	.1%	.0%
Cooper & Chyan Technology	.8	.0	.8	0	.0%	.0%	.1%	.0%
DAT Standard info ssystemes	.8	.0	.7	0	.0%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.0%	.0%	.1%	.0%
CAD Language Systems	.7	.0	.6	0	.0%	.0%	.1%	.0%
Vamp	.7	.0	.7	0	.0%	.0%	.1%	.0%
Inca	.7	.7	.0	3	.0%	.0%	.0%	.0%
ICL	.7	.4	.2	19	.0%	.0%	.0%	.0%
Technische Computer Systeme	.6	.1	.5	17	.0%	.0%	.0%	.0%
Capilano Computing	.5	.0	.5	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.4	.0	.4	0	.0%	.0%	.0%	.0%
PLUS Logic	.4	.0	.4	0	.0%	.0%	.0%	.0%

(Continued)

Table 4 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
The CAD Group	.4	.0	.4	0	.0%	.0%	.0%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.0%	.0%
Andor	.4	.1	.2	3	.0%	.0%	.0%	.0%
Foresight Resources	.3	.0	.3	0	.0%	.0%	.0%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Dolphin Integration	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 4 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	108.5	104.4	.0	10,688	3.2%	6.6%	.0%	8.5%
All Companies	3,424.7	1,589.3	1,210.1	126,397	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,804.3	1,322.0	908.4	115,050	81.9%	83.2%	75.1%	91.0%
All Asian-Based Companies	430.2	230.8	174.0	8,992	12.6%	14.5%	14.4%	7.1%
All European-Based Companies	190.2	36.6	127.7	2,355	5.6%	2.3%	10.6%	1.9%
All Hardware Companies	1,319.9	1,115.8	.0	109,024	38.5%	70.2%	.0%	86.3%
All Turnkey & SW Companies	2,104.8	473.6	1,210.1	17,373	61.5%	29.8%	100.0%	13.7%

Source: Dataquest (September 1992)

Table 5
1991 CAD/CAM/CAE/EDA Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	431.9	374.0	.0	26,592	18.8%	41.8%	.0%	50.2%
Mentor Graphics	396.1	113.8	146.4	3,808	17.2%	12.7%	15.6%	7.2%
Cadence	211.1	.0	166.2	0	9.2%	.0%	17.8%	.0%
Valid	152.1	5.1	108.5	611	6.6%	.6%	11.6%	1.2%
Hewlett-Packard	128.6	102.7	.0	11,794	5.6%	11.5%	.0%	22.3%
Intergraph	121.8	31.4	42.3	1,136	5.3%	3.5%	4.5%	2.1%
Zuken	103.9	41.6	62.3	606	4.5%	4.7%	6.7%	1.1%
Racal-Redac	81.7	.0	66.6	0	3.6%	.0%	7.1%	.0%
Digital	57.5	35.7	4.0	2,236	2.5%	4.0%	.4%	4.2%
Synopsys	40.1	.0	30.1	0	1.7%	.0%	3.2%	.0%
Uchida Yoko	36.8	34.9	1.8	584	1.6%	3.9%	.2%	1.1%
NEC	36.6	20.1	13.5	1,146	1.6%	2.3%	1.4%	2.2%
Harris EDA	32.0	3.6	17.8	158	1.4%	.4%	1.9%	.3%
Fujitsu	30.9	20.9	6.9	748	1.3%	2.3%	.7%	1.4%
COMPASS Design Automation-VLSI	30.0	1.2	23.1	39	1.3%	.1%	2.5%	.1%
Siemens Nixdorf Info systeme	27.8	13.8	9.7	408	1.2%	1.5%	1.0%	.8%
Seiko Instruments—NO OEM	27.3	11.7	12.8	175	1.2%	1.3%	1.4%	.3%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	1.2%	1.6%	1.4%	.3%
Computervision	26.3	10.0	7.4	231	1.1%	1.1%	.8%	.4%
CADIX	22.6	9.0	11.3	166	1.0%	1.0%	1.2%	.3%
Viewlogic Systems	18.9	.0	14.7	0	.8%	.0%	1.6%	.0%
LSI Logic	15.7	1.6	11.8	40	.7%	.2%	1.3%	.1%
Quickturn Systems	14.0	14.0	.0	112	.6%	1.6%	.0%	.2%
Logic Automation	13.9	.0	13.9	0	.6%	.0%	1.5%	.0%

(Continued)

Table 5 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Company	Application: Platform: Region: Units:	Electronic Design Automation Technical Workstation Worldwide Millions of U.S. Dollars/Actual Units	Market Share						
			Total		Hardware		Total		Hardware Units Shipped
			Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Factory Revenue	Hardware Revenue	
EEsof			11.9	.1	10.3	.0%	.5%	1.1%	.0%
Toshiba—NO OEM			11.6	5.8	4.6	.6%	.5%	.5%	.2%
Analogy			10.0	.0	9.0	.0%	.4%	1.0%	.0%
Comdisco Systems			9.8	.0	8.8	.0%	.4%	.9%	.0%
Silvar-Lisco			9.5	.0	5.2	.0%	.4%	.6%	.0%
Ascent Logic Corp			7.5	.0	6.0	.0%	.3%	.6%	.0%
Teradyne			7.2	1.1	4.6	.1%	.3%	.5%	.0%
IBM			7.0	3.6	1.8	.4%	.3%	.2%	.3%
Vantage Analysis Systems			7.0	.0	6.0	.0%	.3%	.6%	.0%
Genrad			6.7	1.3	4.5	.1%	.3%	.5%	.1%
Meta-Software			6.0	.0	5.2	.0%	.3%	.6%	.0%
Test Systems Strategies			5.6	.0	4.8	.0%	.2%	.5%	.0%
Cascade Design Automation			5.5	.0	3.9	.0%	.2%	.4%	.0%
I-Logix			5.5	.0	5.5	.0%	.2%	.6%	.0%
Solbourne			5.2	5.1	.0	.6%	.2%	.0%	2.0%
Tokyo Electron—NO OEM			4.7	1.6	2.3	.2%	.2%	.2%	.0%
AnaCAD			4.5	.0	4.5	.0%	.2%	.5%	.0%
Hitachi			4.5	2.2	1.9	.2%	.2%	.2%	.2%
Quad Design Technology			4.3	.0	4.0	.0%	.2%	.4%	.0%
HP Cade			4.2	2.5	1.3	.3%	.2%	.1%	.1%
Sagantec			4.0	.0	3.6	.0%	.2%	.4%	.0%
Contec Microelectronics			4.0	.0	3.6	.0%	.2%	.4%	.0%
Ontos			3.8	.0	3.8	.0%	.2%	.4%	.0%
Pacific Numerics			3.8	.0	3.8	.0%	.2%	.4%	.0%

(Continued)

Table 5 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Scientific & Engineering SW	3.5	.0	3.5	0	.2%	.0%	.4%	.0%
EPIC Design Technology	3.5	.0	3.1	0	.2%	.0%	.3%	.0%
Sony	3.3	2.9	.0	191	.1%	.3%	.0%	.4%
Century Research Center	2.9	1.6	1.1	18	.1%	.2%	.1%	.0%
Quantic Laboratories	2.9	.0	2.7	0	.1%	.0%	.3%	.0%
Aucotec	2.8	.5	1.8	20	.1%	.1%	.2%	.0%
Motorola	2.5	.0	2.5	0	.1%	.0%	.3%	.0%
ACTEL	2.5	.0	2.3	0	.1%	.0%	.2%	.0%
Wacom	2.5	.6	1.9	25	.1%	.1%	.2%	.0%
Integrated Silicon Systems	2.5	.3	2.1	10	.1%	.0%	.2%	.0%
Autodesk	2.4	.0	2.4	0	.1%	.0%	.3%	.0%
debis Systemhaus	2.1	.5	1.3	11	.1%	.1%	.1%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.2%	.0%
Xilinx	1.8	.0	1.6	0	.1%	.0%	.2%	.0%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.1%	.2%	.0%	.2%
Data I/O	1.5	.0	1.5	0	.1%	.0%	.2%	.0%
Compact Software	1.5	.0	1.5	0	.1%	.0%	.2%	.0%
Omron	1.4	1.2	.1	39	.1%	.1%	.0%	.1%
SIMUCAD	1.3	.0	1.3	0	.1%	.0%	.1%	.0%
DECAD	1.3	.2	.8	4	.1%	.0%	.1%	.0%
National Semiconductor	1.1	.2	.9	12	.0%	.0%	.1%	.0%
Object Design	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Royal Digital Systems	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.9	.0	.8	0	.0%	.0%	.1%	.0%

(Continued)

Table 5 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Objectivity	.9	.0	.9	0	.0%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.0%	.0%	.0%	.0%
Microsim	.9	.0	.8	0	.0%	.0%	.1%	.0%
Cooper & Chyan Technology	.8	.0	.8	0	.0%	.0%	.1%	.0%
Everex Systems	.8	.8	.0	131	.0%	.1%	.0%	.2%
CAD Language Systems	.7	.0	.6	0	.0%	.0%	.1%	.0%
ICL	.7	.4	.2	19	.0%	.0%	.0%	.0%
Infinite Graphics	.5	.0	.5	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.5	.1	.4	12	.0%	.0%	.0%	.0%
ISDATA	.4	.0	.4	0	.0%	.0%	.0%	.0%
ALS Design	.3	.0	.3	0	.0%	.0%	.0%	.0%
Phase Three Logic	.3	.0	.2	0	.0%	.0%	.0%	.0%
Inca	.2	.2	.0	1	.0%	.0%	.0%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
Cadisys	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dolphin Integratori	.0	.0	.0	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	2	.0%	.0%	.0%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 5 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2,296.7	893.7	936.1	52,992	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,847.5	705.4	711.2	48,263	80.4%	78.9%	76.0%	91.1%
All Asian-Based Companies	317.6	169.8	133.6	4,196	13.8%	19.0%	14.3%	7.9%
All European-Based Companies	131.6	18.6	91.4	532	5.7%	2.1%	9.8%	1.0%
All Hardware Companies	637.9	536.9	.0	42,210	27.8%	60.1%	.0%	79.7%
All Turnkey & SW Companies	1,658.8	356.8	936.1	10,782	72.2%	39.9%	100.0%	20.3%

Source: Dataquest (September 1992)

Table 6
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	161.9	110.8	1.0	0	46.8%	47.1%	2.5%	.0%
IBM	35.5	19.1	9.4	466	10.3%	8.1%	23.7%	10.8%
Fujitsu	32.4	22.0	7.2	546	9.4%	9.3%	18.2%	12.6%
Cadence	9.2	.0	7.1	0	2.7%	.0%	17.9%	.0%
Teradyne	6.3	.9	3.9	4	1.8%	.4%	9.9%	.1%
Intergraph	4.3	2.1	.7	58	1.2%	.9%	1.7%	1.3%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	1.0%	.6%	2.8%	.3%
LSI Logic	1.8	.2	1.3	4	.5%	.1%	3.3%	.1%
Hitachi	1.4	.7	.6	24	.4%	.3%	1.5%	.6%
Harris EDA	1.1	.2	.9	9	.3%	.1%	2.1%	.2%
Compact Software	.9	.0	.9	0	.3%	.0%	2.2%	.0%
EEsof	.8	.0	.7	0	.2%	.0%	1.8%	.0%
Meta-Software	.8	.0	.7	0	.2%	.0%	1.8%	.0%
Genrad	.8	.2	.5	2	.2%	.1%	1.3%	.1%
Test Systems Strategies	.6	.0	.6	0	.2%	.0%	1.5%	.0%
COMPASS Design Automation-VLSI	.6	.5	.7	1	.2%	.2%	1.9%	.0%
Aucotec	.6	.1	.4	2	.2%	.0%	.9%	.1%
Analogy	.5	.0	.5	0	.2%	.0%	1.2%	.0%
Electrical Eng. Software	.4	.0	.4	0	.1%	.0%	.9%	.0%
debits Systemhaus	.3	.1	.2	2	.1%	.0%	.5%	.0%
Logic Automation	.3	.0	.3	0	.1%	.0%	.7%	.0%
Data I/O	.3	.0	.3	0	.1%	.0%	.7%	.0%
ISDATA	.2	.0	.1	0	.0%	.0%	.4%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.2%	.0%

(Continued)

Table 6 (Continued)

1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.2%	.0%
SIMUCAD	.1	.0	.1	0	.0%	.0%	.2%	.0%
DECAD	.0	.0	.0	1	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	81.1	77.1	.0	3,185	23.5%	32.7%	.0%	73.8%
All Companies	345.6	235.3	39.6	4,317	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	307.3	211.0	30.0	3,729	88.9%	89.7%	75.7%	86.4%
All Asian-Based Companies	37.1	24.1	8.9	583	10.7%	10.2%	22.5%	13.5%
All European-Based Companies	1.1	.2	.7	4	.3%	.1%	1.8%	.1%
All Hardware Companies	241.7	187.9	.0	3,185	69.9%	79.9%	.0%	73.8%
All Turnkey & SW Companies	103.9	47.4	39.6	1,131	30.1%	20.1%	100.0%	26.2%

Source: Dataquest (September 1992)

Table 7
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	75.2	51.9	.0	611	33.4%	33.5%	.0%	13.0%
Sun Microsystems	59.9	48.9	.0	2,261	26.6%	31.6%	.0%	48.2%
Zycad	30.0	15.6	8.1	230	13.3%	10.1%	34.9%	4.9%
Cadence	13.7	.0	11.0	0	6.1%	.0%	47.5%	.0%
Ikos Systems	13.1	13.1	.0	61	5.8%	8.4%	.0%	1.3%
Solbourne	12.8	12.5	.0	645	5.7%	8.1%	.0%	13.8%
Intergraph	7.2	3.4	1.7	103	3.2%	2.2%	7.4%	2.2%
Hewlett-Packard	6.0	4.9	.0	459	2.7%	3.2%	.0%	9.8%
Sharp System Products—NO OEM	4.1	2.1	1.9	18	1.8%	1.4%	8.4%	.4%
IBM	2.4	1.8	.3	272	1.1%	1.2%	1.3%	5.8%
Racal-Redac	.3	.3	.0	17	.2%	.2%	.0%	.4%
Sumitomo Denko Workstation	.1	.1	.0	11	.1%	.1%	.0%	.2%
SIMUCAD	.1	.0	.1	0	.0%	.0%	.3%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.2%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	224.9	154.6	23.2	4,687	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	220.4	152.1	21.3	4,641	98.0%	98.3%	91.6%	99.0%
All Asian-Based Companies	4.2	2.2	1.9	29	1.9%	1.4%	8.4%	.6%
All European-Based Companies	.3	.3	.0	17	.2%	.2%	.0%	.4%
All Hardware Companies	168.2	132.4	.0	4,313	74.8%	85.6%	.0%	92.0%
All Turnkey & SW Companies	56.7	22.2	23.2	373	25.2%	14.4%	100.0%	8.0%

Source: Dataquest (September 1992)

Table 8
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Shipped	Hardware Revenue	Software Revenue	Hardware Shipped
Compaq	109.0	109.0	.0	21,262	35.7%	.0%	33.0%
IBM	55.0	52.2	.0	13,048	17.1%	.0%	20.3%
Hewlett-Packard	42.4	33.8	.0	8,231	11.1%	.0%	12.8%
Wacom	34.2	6.7	23.7	578	2.2%	11.2%	.9%
Viewlogic Systems	22.1	.0	17.3	0	.0%	8.2%	.0%
NEC	21.6	18.2	1.7	3,052	5.9%	.8%	4.7%
Autodesk	20.0	.0	20.0	0	.0%	9.5%	.0%
Apple Computer	18.5	16.3	.0	3,880	5.3%	.0%	6.0%
Xilinx	16.2	.0	14.6	0	.0%	6.9%	.0%
LPKF	15.0	9.8	3.8	650	3.2%	1.8%	1.0%
Altera	13.7	.0	11.6	0	.0%	5.5%	.0%
CADAM	13.0	3.0	8.5	600	1.0%	4.0%	.9%
Fujitsu	12.1	8.2	2.7	400	2.7%	1.3%	.6%
Orcad	10.5	.0	10.5	0	.0%	5.0%	.0%
ACTEL	10.0	.0	9.0	0	.0%	4.3%	.0%
PADS Software	8.7	.0	7.4	0	.0%	3.5%	.0%
Aucotec	7.9	1.3	5.1	328	.4%	2.4%	.5%
EBsof	7.8	.0	7.0	0	.0%	3.3%	.0%
Microsim	7.6	.0	7.1	0	.0%	3.4%	.0%
Data I/O	7.0	.0	7.0	0	.0%	3.3%	.0%
Everex Systems	6.2	6.2	.0	2,746	2.0%	.0%	4.3%
Kloeckner-Moeller	5.4	1.1	3.8	44	.4%	1.8%	.1%
Ziegler Informatics	4.7	.0	4.7	0	.0%	2.2%	.0%
BETRONEX	4.6	.5	4.1	86	.2%	2.0%	.1%

(Continued)

Table 8 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dell Computer	4.3	4.3	.0	1,107	.8%	1.4%	.0%	1.7%
Racal-Redac	3.9	.0	3.9	0	.7%	.0%	1.9%	.0%
Hitachi	3.1	1.5	1.3	151	.5%	.5%	.6%	.2%
Research Machines	2.9	2.9	.0	460	.5%	.9%	.0%	.7%
Accel Technologies	2.8	.0	2.5	0	.5%	.0%	1.2%	.0%
ALDEC	2.5	.0	2.5	0	.5%	.0%	1.2%	.0%
Visionics	2.4	.0	1.8	10	.4%	.0%	.9%	.0%
ALS Design	2.4	.0	2.4	0	.4%	.0%	1.1%	.0%
Teradyne	2.2	.0	1.7	0	.4%	.0%	.8%	.0%
CAD-UL	2.1	.0	2.1	0	.4%	.0%	1.0%	.0%
Infinite Graphics	2.0	.0	2.0	0	.4%	.0%	.9%	.0%
Harris EDA	1.9	.1	1.2	2	.3%	.0%	.6%	.0%
Massteck	1.8	.0	1.8	0	.3%	.0%	.8%	.0%
Caditron	1.6	.8	.6	25	.3%	.3%	.3%	.0%
Tanner Research	1.4	.0	1.2	0	.3%	.0%	.6%	.0%
ISDATA	1.4	.0	1.2	0	.2%	.0%	.6%	.0%
Compact Software	1.3	.0	1.3	0	.2%	.0%	.6%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.2%	.1%	.4%	.2%
Spectrum Software	1.1	.0	1.1	0	.2%	.0%	.5%	.0%
Serbi	1.1	.0	1.1	0	.2%	.0%	.5%	.0%
Intrinsic	1.0	1.0	.0	10	.2%	.3%	.0%	.0%
Omaton	.9	.0	.9	0	.2%	.0%	.4%	.0%
Cadsys	.9	.0	.9	0	.2%	.0%	.4%	.0%
Number One Systems	.8	.2	.6	61	.1%	.0%	.3%	.1%

(Continued)

Table 8 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
DAT Standard info systems	.8	.0	.7	0	.1%	.0%	.3%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.4%	.0%
Phase Three Logic	.7	.0	.7	0	.1%	.0%	.3%	.0%
Vamp	.7	.0	.7	0	.1%	.0%	.3%	.0%
Digital	.6	.0	.4	0	.1%	.0%	.2%	.0%
Integrated Silicon Systems	.6	.2	.4	8	.1%	.1%	.2%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.2%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
PLUS Logic	.4	.0	.4	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
Andor	.4	.1	.2	3	.1%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
debis Systemhaus	.3	.1	.2	6	.1%	.0%	.1%	.0%
Foresight Resources	.3	.0	.3	0	.1%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Genrad	.2	.0	.2	10	.0%	.0%	.1%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.2	.0	.2	5	.0%	.0%	.1%	.0%

(Continued)

Table 8 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Masta Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	27.4	27.4	.0	7,503	4.9%	9.0%	.0%	11.7%
All Companies	557.5	305.7	211.1	64,402	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	429.1	253.6	145.9	58,417	77.0%	83.0%	69.1%	90.7%
All Asian-Based Companies	71.3	34.6	29.6	4,184	12.8%	11.3%	14.0%	6.5%
All European-Based Companies	57.2	17.5	35.6	1,801	10.3%	5.7%	16.9%	2.8%
All Hardware Companies	272.1	258.5	.0	59,316	48.8%	84.6%	.0%	92.1%
All Turnkey & SW Companies	285.4	47.2	211.1	5,086	51.2%	15.4%	100.0%	7.9%

Source: Dataquest (September 1992)

Table 9
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation

Platform: All Platforms

Region: North America

Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share				Hardware		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	236.8	203.7	.0	203.7	16.8%	32.2%	.0%	32.2%	.0%	28.2%
Mentor Graphics	190.1	59.9	65.6	59.9	13.5%	9.5%	13.4%	9.5%	13.4%	3.4%
Digital	143.9	95.4	4.4	95.4	10.2%	15.1%	.9%	15.1%	.9%	2.5%
Cadence	118.0	.0	79.7	.0	8.4%	.0%	16.3%	.0%	16.3%	.0%
Valid	79.6	4.0	55.7	4.0	5.7%	.6%	11.4%	.6%	11.4%	1.0%
Intergraph	60.9	20.2	19.0	20.2	4.3%	3.2%	3.9%	3.2%	3.9%	1.2%
Hewlett-Packard	60.3	49.6	.0	49.6	4.3%	7.8%	.0%	7.8%	.0%	14.3%
Compaq	50.2	50.2	.0	50.2	3.6%	7.9%	.0%	7.9%	.0%	18.0%
Viewlogic Systems	27.5	.0	21.4	.0	2.0%	.0%	4.4%	.0%	4.4%	.0%
IBM	24.7	19.3	2.6	19.3	1.7%	3.1%	.5%	3.1%	.5%	6.7%
Synopsys	24.1	.0	18.0	.0	1.7%	.0%	3.7%	.0%	3.7%	.0%
Racal-Redac	19.9	.2	16.6	.2	1.4%	.0%	3.4%	.0%	3.4%	.0%
Zycad	19.5	10.1	5.3	10.1	1.4%	1.6%	1.1%	1.6%	1.1%	.3%
Harris EDA	17.1	2.3	9.5	2.3	1.2%	.4%	1.9%	.4%	1.9%	.2%
COMPASS Design Automation-VLSI	15.9	.9	12.5	.9	1.1%	.1%	2.6%	.1%	2.6%	.0%
Solbourne	12.6	12.4	.0	12.4	.9%	2.0%	.0%	2.0%	.0%	2.1%
Xilinx	11.7	.0	10.5	.0	.8%	.0%	2.2%	.0%	2.2%	.0%
Apple Computer	11.5	10.1	.0	10.1	.8%	1.6%	.0%	1.6%	.0%	4.4%
LSI Logic	10.5	1.0	7.9	1.0	.7%	.2%	1.6%	.2%	1.6%	.0%
Teradyne	9.9	1.2	6.4	1.2	.7%	.2%	1.3%	.2%	1.3%	.0%
Autodesk	9.6	.0	9.6	.0	.7%	.0%	2.0%	.0%	2.0%	.0%
Logic Automation	9.2	.0	9.2	.0	.7%	.0%	1.9%	.0%	1.9%	.0%
Quickturn Systems	9.1	9.1	.0	9.1	.6%	1.4%	.0%	1.4%	.0%	.1%
EESof	8.4	.1	7.4	.1	.6%	.0%	1.5%	.0%	1.5%	.0%

(Continued)

Table 9 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Company	Application: Platform: Region: Units:	Electronic Design Automation All Platforms North America Millions of U.S. Dollars/Actual Units	Market Share					
			Total		Hardware		Total	
			Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue
Altera			7.9	.0	6.7	0	.6%	.0%
Ikos Systems			7.8	7.8	.0	37	.6%	1.2%
ACTEL			7.8	.0	7.0	0	.6%	.0%
Ascent Logic Corp			7.5	.0	6.0	0	.5%	.0%
Computervision			7.3	2.6	2.5	83	.5%	.4%
Comdisco Systems			6.3	.0	5.6	0	.4%	.0%
Everex Systems			6.1	6.1	.0	2,502	.4%	1.0%
Microsim			5.8	.0	5.4	0	.4%	.0%
Zuken			5.2	2.1	3.1	30	.4%	.3%
Meta-Software			5.1	.0	4.5	0	.4%	.0%
Analogy			4.7	.0	4.3	0	.3%	.0%
Quad Design Technology			4.3	.0	4.0	0	.3%	.0%
PADS Software			4.2	.0	3.6	0	.3%	.0%
I-Logix			4.1	.0	4.1	0	.3%	.0%
Vantage Analysis Systems			3.9	.0	3.3	0	.3%	.0%
CADAM			3.8	.9	2.5	180	.3%	.1%
Data I/O			3.7	.0	3.7	0	.3%	.0%
Test Systems Strategies			3.7	.0	3.2	0	.3%	.0%
Orcad			3.7	.0	3.7	0	.3%	.0%
Ontos			3.6	.0	3.6	0	.3%	.0%
Pacific Numerics			3.6	.0	3.6	0	.3%	.0%
Genrad			3.5	.7	2.3	35	.2%	.1%
Cascade Design Automation			3.3	.0	2.3	0	.2%	.0%
EPIC Design Technology			3.1	.0	2.8	0	.2%	.0%

(Continued)

Table 9 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dell Computer	2.8	2.8	.0	719	.2%	.4%	.0%	1.3%
Infinite Graphics	2.5	.0	2.5	0	.2%	.0%	.5%	.0%
Silvar-Lisco	2.5	.0	1.4	0	.2%	.0%	.3%	.0%
Scientific & Engineering SW	2.5	.0	2.5	0	.2%	.0%	.5%	.0%
Visionics	2.4	.0	1.8	10	.2%	.0%	.4%	.0%
Quantic Laboratories	2.3	.0	2.1	0	.2%	.0%	.4%	.0%
Motorola	2.1	.0	2.1	0	.2%	.0%	.4%	.0%
Accel Technologies	2.1	.0	1.9	0	.1%	.0%	.4%	.0%
ALDEC	1.9	.0	1.9	0	.1%	.0%	.4%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.4%	.0%
Integrated Silicon Systems	1.8	.3	1.4	10	.1%	.0%	.3%	.0%
Contec Microelectronics	1.6	.0	1.4	0	.1%	.0%	.3%	.0%
LPKF	1.5	1.0	.4	65	.1%	.2%	.1%	.1%
SIMUCAD	1.5	.0	1.4	0	.1%	.0%	.3%	.0%
Compact Software	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
Massteck	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
BETRONEX	1.2	.1	1.0	22	.1%	.0%	.2%	.0%
Tanner Research	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Phase Three Logic	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Cadisys	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.2%	.0%	.0%
Spectrum Software	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Royal Digital Systems	.8	.0	.7	0	.1%	.0%	.2%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.2%	.0%

(Continued)

Table 9 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Object Design	.8	.0	.8	0	.1%	.0%	.2%	.0%
Objectivity	.7	.0	.7	0	.1%	.0%	.1%	.0%
National Semiconductor	.7	.1	.6	7	.1%	.0%	.1%	.0%
Electrical Eng. Software	.6	.0	.5	0	.0%	.0%	.1%	.0%
Omaton	.6	.0	.6	0	.0%	.0%	.1%	.0%
Vamp	.6	.0	.6	0	.0%	.0%	.1%	.0%
Caplano Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
PLUS Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
CAD Language Systems	.4	.0	.4	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
Foresight Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cooper & Chyan Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
Number One Systems	.0	.0	.0	3	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 9 (Continued)

1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	59.8	57.6	.0	5,872	4.2%	9.1%	.0%	10.8%
All Companies	1,408.7	632.6	488.8	54,424	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,380.9	629.3	467.6	54,296	98.0%	99.5%	95.7%	99.8%
All Asian-Based Companies	5.2	2.1	3.1	30	.4%	.3%	.6%	.1%
All European-Based Companies	22.6	1.3	18.1	98	1.6%	.2%	3.7%	.2%
All Hardware Companies	610.7	519.5	.0	50,647	43.4%	82.1%	.0%	93.1%
All Turnkey & SW Companies	798.0	113.2	488.8	3,777	56.6%	17.9%	100.0%	6.9%

Source: Dataquest (September 1992)

Table 10
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	208.0	180.1	.0	13,955	22.2%	53.0%	.0%	59.1%
Mentor Graphics	190.1	59.9	65.6	1,828	20.3%	17.6%	17.3%	7.7%
Cadence	107.0	.0	72.3	0	11.4%	.0%	19.1%	.0%
Valid	79.6	4.0	55.7	540	8.5%	1.2%	14.7%	2.3%
Intergraph	54.1	16.9	17.6	559	5.8%	5.0%	4.6%	2.4%
Hewlett-Packard	45.1	37.4	.0	4,410	4.8%	11.0%	.0%	18.7%
Digital	29.3	17.3	3.2	1,064	3.1%	5.1%	.9%	4.5%
Synopsys	24.1	.0	18.0	0	2.6%	.0%	4.8%	.0%
Racal-Redac	18.6	.0	15.4	0	2.0%	.0%	4.1%	.0%
COMPASS Design Automation-VLSI	15.6	.6	12.1	20	1.7%	.2%	3.2%	.1%
Harris EDA	15.2	2.0	8.2	72	1.6%	.6%	2.2%	.3%
Viewlogic Systems	12.6	.0	9.9	0	1.4%	.0%	2.6%	.0%
LSI Logic	9.4	.9	7.1	24	1.0%	.3%	1.9%	.1%
Quickturn Systems	9.1	9.1	.0	73	1.0%	2.7%	.0%	.3%
Logic Automation	9.0	.0	9.0	0	1.0%	.0%	2.4%	.0%
Ascent Logic Corp	7.5	.0	6.0	0	.8%	.0%	1.6%	.0%
Computervision	7.3	2.6	2.5	83	.8%	.8%	.6%	.4%
Comdisco Systems	6.3	.0	5.6	0	.7%	.0%	1.5%	.0%
Zuken	5.2	2.1	3.1	30	.6%	.6%	.8%	.1%
EEsof	4.9	.1	4.2	6	.5%	.0%	1.1%	.0%
Teradyne	4.5	.7	2.9	16	.5%	.2%	.8%	.1%
Analogy	4.5	.0	4.1	0	.5%	.0%	1.1%	.0%
Meta-Software	4.5	.0	3.9	0	.5%	.0%	1.0%	.0%
Quad Design Technology	4.3	.0	4.0	0	.5%	.0%	1.0%	.0%

(Continued)

Table 10 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
I-Logix	4.1	.0	4.1	0	.4%	.0%	1.1%	.0%
Vantage Analysis Systems	3.9	.0	3.3	0	.4%	.0%	.9%	.0%
Solbourne	3.7	3.6	.0	711	.4%	1.1%	.0%	3.0%
Ontos	3.6	.0	3.6	0	.4%	.0%	1.0%	.0%
Pacific Numerics	3.4	.0	3.4	0	.4%	.0%	.9%	.0%
Test Systems Strategies	3.4	.0	2.9	0	.4%	.0%	.8%	.0%
Cascade Design Automation	3.3	.0	2.3	0	.4%	.0%	.6%	.0%
EPIC Design Technology	3.1	.0	2.8	0	.3%	.0%	.7%	.0%
Genrad	3.0	.6	2.0	29	.3%	.2%	.5%	.1%
Silvar-Lisco	2.5	.0	1.4	0	.3%	.0%	.4%	.0%
Scientific & Engineering SW	2.5	.0	2.5	0	.3%	.0%	.6%	.0%
Quantic Laboratories	2.3	.0	2.1	0	.2%	.0%	.6%	.0%
Motorola	2.1	.0	2.1	0	.2%	.0%	.6%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.2%	.0%	.5%	.0%
IBM	1.6	.9	.4	48	.2%	.3%	.1%	.2%
Contec Microelectronics	1.6	.0	1.4	0	.2%	.0%	.4%	.0%
ACTEL	1.6	.0	1.4	0	.2%	.0%	.4%	.0%
Integrated Silicon Systems	1.4	.2	1.2	6	.2%	.1%	.3%	.0%
Xilinx	1.2	.0	1.1	0	.1%	.0%	.3%	.0%
SIMUCAD	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Autodesk	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Royal Digital Systems	.8	.0	.7	0	.1%	.0%	.2%	.0%
Object Design	.8	.0	.8	0	.1%	.0%	.2%	.0%
Objectivity	.7	.0	.7	0	.1%	.0%	.2%	.0%

(Continued)

Table 10 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Everex Systems	.7	.7	.0	114	.1%	.2%	.0%	.5%
National Semiconductor	.7	.1	.5	7	.1%	.0%	.1%	.0%
Data I/O	.6	.0	.6	0	.1%	.0%	.2%	.0%
Compact Software	.6	.0	.6	0	.1%	.0%	.2%	.0%
Microsim	.6	.0	.5	0	.1%	.0%	.1%	.0%
Infinite Graphics	.5	.0	.5	0	.1%	.0%	.1%	.0%
CAD Language Systems	.4	.0	.4	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.4	.0	.4	0	.0%	.0%	.1%	.0%
Phase Three Logic	.3	.0	.2	0	.0%	.0%	.1%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
Cooper & Chyan Technology	.1	.0	.1	0	.0%	.0%	.0%	.0%
Cadisys	.1	.0	.1	0	.0%	.0%	.0%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	935.7	339.6	379.0	23,596	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	911.9	337.5	360.4	23,565	97.5%	99.4%	95.1%	99.9%
All Asian-Based Companies	5.2	2.1	3.1	30	.6%	.6%	.8%	.1%
All European-Based Companies	18.6	.0	15.4	0	2.0%	.0%	4.1%	.0%
All Hardware Companies	291.6	248.2	.0	20,327	31.2%	73.1%	.0%	86.1%
All Turnkey & SW Companies	644.2	91.4	379.0	3,269	68.8%	26.9%	100.0%	13.9%

Source: Dataquest (September 1992)

Table 11
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	78.1	53.2	.8	0	53.2%	52.2%	5.7%	.0%
IBM	8.2	4.4	2.2	115	5.6%	4.3%	15.9%	6.1%
Cadence	5.0	.0	3.4	0	3.4%	.0%	24.7%	.0%
Teradyne	4.0	.6	2.4	2	2.7%	.5%	18.0%	.1%
Intergraph	2.5	1.3	.4	33	1.7%	1.2%	2.9%	1.7%
LSI Logic	1.1	.1	.8	2	.7%	.1%	5.9%	.1%
Harris EDA	.9	.2	.7	7	.6%	.2%	4.9%	.4%
Meta-Software	.6	.0	.5	0	.4%	.0%	3.9%	.0%
Test Systems Strategies	.4	.0	.4	0	.2%	.0%	2.7%	.0%
Compact Software	.4	.0	.4	0	.2%	.0%	2.6%	.0%
Genrad	.3	.1	.2	1	.2%	.1%	1.7%	.1%
EEsof	.3	.0	.3	0	.2%	.0%	2.2%	.0%
COMPASS Design Automation-VLSI	.3	.3	.4	0	.2%	.3%	3.1%	.0%
Analogy	.2	.0	.2	0	.2%	.0%	1.6%	.0%
Logic Automation	.2	.0	.2	0	.1%	.0%	1.3%	.0%
Electrical Eng. Software	.2	.0	.2	0	.1%	.0%	1.2%	.0%
Data I/O	.1	.0	.1	0	.1%	.0%	.8%	.0%
SIMUCAD	.1	.0	.1	0	.0%	.0%	.5%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.4%	.0%

(Continued)

Table 11 (Continued)
1991 CAD/CAM/CAB/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	44.1	41.9	.0	1,731	30.0%	41.1%	.0%	91.5%
All Companies	146.9	101.9	13.6	1,892	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	146.9	101.9	13.6	1,892	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	121.2	95.1	.0	1,731	82.5%	93.3%	.0%	91.5%
All Turnkey & SW Companies	25.7	6.9	13.6	161	17.5%	6.7%	100.0%	8.5%

Source: Dataquest (September 1992)

Table 12
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	36.1	24.9	.0	291	31.4%	31.2%	.0%	11.1%
Sun Microsystems	28.9	23.6	.0	1,390	25.1%	29.5%	.0%	52.8%
Zycad	19.5	10.1	5.3	150	17.0%	12.7%	50.3%	5.7%
Solbourne	8.9	8.8	.0	433	7.8%	11.0%	.0%	16.5%
Ikos Systems	7.8	7.8	.0	37	6.8%	9.8%	.0%	1.4%
Cadence	6.0	.0	4.0	0	5.2%	.0%	38.6%	.0%
Intergraph	4.2	2.0	1.0	61	3.7%	2.6%	9.8%	2.3%
Hewlett-Packard	2.5	2.1	.0	193	2.2%	2.6%	.0%	7.3%
IBM	.6	.5	.1	71	.5%	.6%	.7%	2.7%
Racal-Redac	.2	.2	.0	8	.1%	.2%	.0%	.3%
SIMUCAD	.1	.0	.1	0	.1%	.0%	.7%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	114.8	79.9	10.5	2,632	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	114.6	79.8	10.5	2,624	99.9%	99.8%	100.0%	99.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.2	.0	8	.1%	.2%	.0%	.3%
All Hardware Companies	84.5	67.4	.0	2,413	73.7%	84.3%	.0%	91.7%
All Turnkey & SW Companies	30.2	12.5	10.5	219	26.3%	15.7%	100.0%	8.3%

Source: Dataquest (September 1992)

Table 13
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Personal Computer
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Shipped	Hardware Units
Compaq	50.2	50.2	.0	9,781	23.7%	45.1%	.0%	37.2%	.0%
Viewlogic Systems	14.8	.0	11.6	0	7.0%	.0%	13.5%	.0%	.0%
IBM	14.3	13.6	.0	3,392	6.8%	12.2%	.0%	12.9%	.0%
Hewlett-Packard	12.7	10.2	.0	3,168	6.0%	9.1%	.0%	12.0%	.0%
Apple Computer	11.5	10.1	.0	2,406	5.4%	9.1%	.0%	9.1%	.0%
Xilinx	10.5	.0	9.5	0	5.0%	.0%	11.1%	.0%	.0%
Autodesk	8.6	.0	8.6	0	4.1%	.0%	10.1%	.0%	.0%
Altera	7.9	.0	6.7	0	3.7%	.0%	7.8%	.0%	.0%
ACTEL	6.2	.0	5.6	0	2.9%	.0%	6.5%	.0%	.0%
Everex Systems	5.4	5.4	.0	2,389	2.6%	4.9%	.0%	9.1%	.0%
Microsim	5.1	.0	4.8	0	2.4%	.0%	5.6%	.0%	.0%
PADS Software	4.2	.0	3.6	0	2.0%	.0%	4.1%	.0%	.0%
CADAM	3.8	.9	2.5	180	1.8%	.8%	2.9%	.7%	.0%
Orcad	3.7	.0	3.7	0	1.7%	.0%	4.3%	.0%	.0%
EEsof	3.2	.0	2.9	0	1.5%	.0%	3.3%	.0%	.0%
Data I/O	3.0	.0	3.0	0	1.4%	.0%	3.5%	.0%	.0%
Dell Computer	2.8	2.8	.0	719	1.3%	2.5%	.0%	2.7%	.0%
Visionics	2.4	.0	1.8	10	1.2%	.0%	2.1%	.0%	.0%
Accel Technologies	2.1	.0	1.9	0	1.0%	.0%	2.2%	.0%	.0%
Infinite Graphics	2.0	.0	2.0	0	.9%	.0%	2.3%	.0%	.0%
ALDEC	1.9	.0	1.9	0	.9%	.0%	2.2%	.0%	.0%
LPKF	1.5	1.0	.4	65	.7%	.9%	.4%	.2%	.0%
Teradyne	1.4	.0	1.0	0	.7%	.0%	1.2%	.0%	.0%
Massteck	1.2	.0	1.2	0	.6%	.0%	1.4%	.0%	.0%

(Continued)

Table 13 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Racal-Redac	1.2	.0	1.2	0	.6%	.0%	1.4%	.0%
BETRONEX	1.2	.1	1.0	22	.5%	.1%	1.2%	.1%
Tanner Research	1.1	.0	1.0	0	.5%	.0%	1.2%	.0%
Harris EDA	1.1	.2	.6	9	.5%	.1%	.7%	.0%
Intrinsix	1.0	1.0	.0	10	.5%	.9%	.0%	.0%
Spectrum Software	1.0	.0	1.0	0	.5%	.0%	1.2%	.0%
Cadisy	.9	.0	.9	0	.4%	.0%	1.0%	.0%
Douglas Electronics	.8	.0	.8	0	.4%	.0%	.9%	.0%
Phase Three Logic	.7	.0	.7	0	.3%	.0%	.8%	.0%
Omaton	.6	.0	.6	0	.3%	.0%	.7%	.0%
Vamp	.6	.0	.6	0	.3%	.0%	.7%	.0%
Compact Software	.5	.0	.5	0	.2%	.0%	.6%	.0%
Digital	.5	.0	.3	0	.2%	.0%	.4%	.0%
Capilano Computing	.5	.0	.5	0	.2%	.0%	.5%	.0%
PLUS Logic	.4	.0	.4	0	.2%	.0%	.5%	.0%
American Small Business Comp.	.4	.0	.4	0	.2%	.0%	.5%	.0%
The CAD Group	.4	.0	.4	0	.2%	.0%	.4%	.0%
Integrated Silicon Systems	.4	.1	.2	5	.2%	.1%	.3%	.0%
BV Engineering	.4	.0	.4	0	.2%	.0%	.4%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.1%	.0%	.3%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.3%	.0%
SIMUCAD	.2	.0	.2	0	.1%	.0%	.2%	.0%
Innovative Data Design	.2	.0	.2	0	.1%	.0%	.2%	.0%
Foresight Resources	.2	.0	.2	0	.1%	.0%	.2%	.0%

(Continued)

Table 13 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Pacific Numerics	.2	.0	.2	0	.1%	.0%	.2%	.0%
Simutest	.2	.0	.2	0	.1%	.0%	.2%	.0%
Cascade Graphics	.2	.0	.2	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Number One Systems	.0	.0	.0	3	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	15.7	15.7	.0	4,141	7.4%	14.1%	.0%	15.7%
All Companies	211.4	111.2	85.8	26,304	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	207.5	110.1	83.1	26,214	98.2%	99.0%	96.9%	99.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	3.9	1.1	2.7	90	1.8%	1.0%	3.1%	.3%
All Hardware Companies	113.5	108.8	.0	26,176	53.7%	97.8%	.0%	99.5%
All Turnkey & SW Companies	97.9	2.4	85.8	128	46.3%	2.2%	100.0%	.5%

Source: Dataquest (September 1992)

Table 14
1991 CAD/CAM/CAE/EDA Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	125.5	107.9	.0	6,363	12.8%	23.0%	.0%	15.1%
Digital	115.2	79.1	.0	1,155	11.7%	16.8%	.0%	2.7%
Mentor Graphics	114.9	27.5	47.1	1,104	11.7%	5.9%	15.4%	2.6%
Hewlett-Packard	83.7	64.7	.0	9,114	8.5%	13.8%	.0%	21.6%
Intergraph	54.9	12.7	19.2	498	5.6%	2.7%	6.3%	1.2%
Compaq	50.2	50.2	.0	9,781	5.1%	10.7%	.0%	23.2%
Racal-Redac	45.5	.2	38.1	9	4.6%	.0%	12.5%	.0%
IBM	45.0	34.4	5.2	6,261	4.6%	7.3%	1.7%	14.9%
Valid	36.5	1.2	23.3	71	3.7%	.2%	7.6%	.2%
Cadence	34.6	.0	23.3	0	3.5%	.0%	7.6%	.0%
Siemens Nixdorf Info systems	27.8	13.8	9.7	408	2.8%	2.9%	3.2%	1.0%
Computervision	16.5	6.4	3.8	124	1.7%	1.4%	1.3%	.3%
Harris EDA	13.0	.9	7.7	57	1.3%	.2%	2.5%	.1%
LPKF	12.0	7.8	3.0	520	1.2%	1.7%	1.0%	1.2%
Aucotec	11.3	1.9	7.3	350	1.1%	.4%	2.4%	.8%
Autodesk	10.0	.0	10.0	0	1.0%	.0%	3.3%	.0%
COMPASS Design Automation-VLSI	8.3	.5	6.4	11	.8%	.1%	2.1%	.0%
Synopsys	8.0	.0	6.0	0	.8%	.0%	2.0%	.0%
EEsof	7.2	.0	6.3	5	.7%	.0%	2.1%	.0%
Kloeckner-Moeller	5.4	1.1	3.8	44	.6%	.2%	1.3%	.1%
Viewlogic Systems	5.3	.0	4.2	0	.5%	.0%	1.4%	.0%
Orcad	4.9	.0	4.9	0	.5%	.0%	1.6%	.0%
Apple Computer	4.8	4.2	.0	1,009	.5%	.9%	.0%	2.4%
Ziegler Informatics	4.7	.0	4.7	0	.5%	.0%	1.5%	.0%

(Continued)

Table 14 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Platform: Region: Units:	Electronic Design Automation All Platforms Europe Millions of U.S. Dollars/Actual Units	Market Share											
		Total			Hardware		Total		Hardware		Hardware		
		Factory Revenue	Hardware Revenue	Software Revenue	Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Units Shipped
Company													
AnaCAD		4.5	.0	4.5	0	.5%	4.5	.0%	1.5%	.0%			.0%
Zycad		4.5	2.3	1.2	34	.5%		.5%	.4%				.1%
Tetadyne		4.4	.5	2.8	8	.4%		.1%	.9%				.0%
LSI Logic		4.4	.4	3.3	11	.4%		.1%	1.1%				.0%
Analogy		4.2	.0	3.8	0	.4%		.0%	1.2%				.0%
HP Code		4.2	2.5	1.3	42	.4%		.5%	.4%				.1%
Sagantec		4.0	.0	3.6	0	.4%		.0%	1.2%				.0%
Solbourne		4.0	3.8	.0	373	.4%		.8%	.0%				.9%
Altera		3.7	.0	3.1	0	.4%		.0%	1.0%				.0%
Logic Automation		3.5	.0	3.5	0	.4%		.0%	1.2%				.0%
Genrad		3.5	.7	2.3	35	.4%		.1%	.8%				.1%
Xilinx		3.2	.0	2.9	0	.3%		.0%	1.0%				.0%
Research Machines		2.9	2.9	.0	460	.3%		.6%	.0%				1.1%
debis Systemhaus		2.8	.7	1.7	19	.3%		.1%	.5%				.0%
ALS Design		2.6	.0	2.6	0	.3%		.0%	.9%				.0%
Ikos Systems		2.6	2.6	.0	12	.3%		.6%	.0%				.0%
Silvar-Lisco		2.6	.0	1.4	0	.3%		.0%	.5%				.0%
CADAM		2.5	.6	1.6	120	.3%		.1%	.5%				.3%
ACTEL		2.5	.0	2.3	0	.3%		.0%	.7%				.0%
Vantage Analysis Systems		2.1	.0	1.8	0	.2%		.0%	.6%				.0%
BETRONEX		2.1	.2	1.8	39	.2%		.0%	.6%				.1%
CAD-UL		2.1	.0	2.1	0	.2%		.0%	.7%				.0%
PADS Software		2.1	.0	1.7	0	.2%		.0%	.6%				.0%
Data I/O		2.0	.0	2.0	0	.2%		.0%	.7%				.0%
(Continued)													

(Continued)

Table 14 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ISDATA	2.0	.0	1.8	0	.2%	.0%	.6%	.0%
Comdisco Systems	1.8	.0	1.6	0	.2%	.0%	.5%	.0%
Microsim	1.7	.0	1.6	0	.2%	.0%	.5%	.0%
Caditron	1.6	.8	.6	25	.2%	.2%	.2%	.1%
Dell Computer	1.5	1.5	.0	387	.2%	.3%	.0%	.9%
Quickturn Systems	1.4	1.4	.0	11	.1%	.3%	.0%	.0%
DECAD	1.3	.2	.8	5	.1%	.0%	.3%	.0%
Test Systems Strategies	1.2	.0	1.1	0	.1%	.0%	.4%	.0%
Aucos elektronische Geräte	1.2	.4	.8	116	.1%	.1%	.3%	.3%
Serbi	1.1	.0	1.1	0	.1%	.0%	.4%	.0%
Zuken	1.0	.4	.6	6	.1%	.1%	.2%	.0%
Compact Software	.9	.0	.9	0	.1%	.0%	.3%	.0%
ISKA	.9	.4	.4	16	.1%	.1%	.1%	.0%
i-Logix	.8	.0	.8	0	.1%	.0%	.3%	.0%
DAT Standard info systems	.8	.0	.7	0	.1%	.0%	.2%	.0%
Number One Systems	.7	.1	.6	54	.1%	.0%	.2%	.1%
Inca	.7	.7	.0	3	.1%	.2%	.0%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.1%	.0%	.2%	.0%
Everex Systems	.7	.7	.0	288	.1%	.1%	.0%	.7%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.0%
Technische Computer Systeme	.6	.1	.5	16	.1%	.0%	.2%	.0%
Cascade Design Automation	.6	.0	.4	0	.1%	.0%	.1%	.0%
ALDEC	.5	.0	.5	0	.1%	.0%	.2%	.0%
National Semiconductor	.5	.1	.4	5	.0%	.0%	.1%	.0%

(Continued)

Table 14 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Massteck	.4	.0	.4	0	.0%	.0%	.1%	.0%
Pacific Numerics	.4	.0	.4	0	.0%	.0%	.1%	.0%
Accel Technologies	.4	.0	.4	0	.0%	.0%	.1%	.0%
Omaton	.3	.0	.3	0	.0%	.0%	.1%	.0%
Motorola	.3	.0	.3	0	.0%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Tanner Research	.2	.0	.2	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
CAD Language Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Ontos	.2	.0	.2	0	.0%	.0%	.1%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.2	.0	.1	1	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.0%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.0%	.0%
Vamp	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dolphin Integration	.1	.0	.1	0	.0%	.0%	.0%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 14 (Continued)
1991 CAD/CAM/CAB/CES Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	31.8	30.6	.0	3,150	3.2%	6.5%	.0%	7.5%
All Companies	983.0	469.5	305.4	42,156	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	838.0	434.9	212.8	39,989	85.2%	92.6%	69.7%	94.9%
All Asian-Based Companies	1.0	.4	.6	6	.1%	.1%	.2%	.0%
All European-Based Companies	144.0	34.2	92.1	2,161	14.6%	7.3%	30.1%	5.1%
All Hardware Companies	453.7	377.7	.0	38,694	46.2%	80.5%	.0%	91.8%
All Turnkey & SW Companies	529.3	91.7	305.4	3,462	53.8%	19.5%	100.0%	8.2%

Source: Dataquest (September 1992)

Table 15
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	114.9	27.5	47.1	1,104	18.9%	12.1%	20.9%	7.4%
Sun Microsystems	110.2	95.4	.0	5,996	18.2%	42.1%	.0%	40.2%
Hewlett-Packard	60.0	45.7	.0	5,284	9.9%	20.2%	.0%	35.4%
Intergraph	51.0	10.8	18.4	445	8.4%	4.8%	8.1%	3.0%
Racal-Redac	42.6	.0	35.4	0	7.0%	.0%	15.7%	.0%
Valid	36.5	1.2	23.3	71	6.0%	.5%	10.3%	.5%
Cadence	31.2	.0	21.1	0	5.1%	.0%	9.3%	.0%
Siemens Nixdorf Info systeme	27.8	13.8	9.7	408	4.6%	6.1%	4.3%	2.7%
Digital	20.9	14.0	.0	907	3.4%	6.2%	.0%	6.1%
Computervision	16.5	6.4	3.8	124	2.7%	2.8%	1.7%	.8%
Harris EDA	12.2	1.0	7.2	64	2.0%	.4%	3.2%	.4%
COMPASS Design Automation-VLSI	8.1	.3	6.2	11	1.3%	.1%	2.8%	.1%
Synopsys	8.0	.0	6.0	0	1.3%	.0%	2.7%	.0%
AnaCAD	4.5	.0	4.5	0	.7%	.0%	2.0%	.0%
HP Cade	4.2	2.5	1.3	42	.7%	1.1%	.6%	.3%
EEsof	4.2	.0	3.6	5	.7%	.0%	1.6%	.0%
Sagantec	4.0	.0	3.6	0	.7%	.0%	1.6%	.0%
Analogy	4.0	.0	3.6	0	.7%	.0%	1.6%	.0%
LSI Logic	3.9	.4	3.0	10	.6%	.2%	1.3%	.1%
Logic Automation	3.5	.0	3.5	0	.6%	.0%	1.5%	.0%
IBM	3.2	1.5	.8	75	.5%	.6%	.4%	.5%
Genrad	3.0	.6	2.0	29	.5%	.3%	.9%	.2%
Aucotec	2.8	.5	1.8	20	.5%	.2%	.8%	.1%
Silvar-Lisc	2.6	.0	1.4	0	.4%	.0%	.6%	.0%

(Continued)

Table 15 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Viewlogic Systems	2.5	.0	1.9	0	.4%	.0%	.9%	.0%
debis Systemhaus	2.1	.5	1.3	11	.3%	.2%	.6%	.1%
Vantage Analysis Systems	2.1	.0	1.8	0	.3%	.0%	.8%	.0%
Teradyne	2.0	.3	1.3	7	.3%	.1%	.6%	.0%
Comdisco Systems	1.8	.0	1.6	0	.3%	.0%	.7%	.0%
Quickturn Systems	1.4	1.4	.0	11	.2%	.6%	.0%	.1%
DECAD	1.3	.2	.8	4	.2%	.1%	.3%	.0%
Solbourne	1.2	1.1	.0	232	.2%	.5%	.0%	1.6%
Autodesk	1.1	.0	1.1	0	.2%	.0%	.5%	.0%
Test Systems Strategies	1.1	.0	1.0	0	.2%	.0%	.4%	.0%
Zuken	1.0	.4	.6	6	.2%	.2%	.3%	.0%
ISKA	.9	.4	.4	16	.1%	.2%	.2%	.1%
I-Logix	.8	.0	.8	0	.1%	.0%	.4%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.1%	.0%	.3%	.0%
ICL	.7	.4	.2	19	.1%	.2%	.1%	.1%
Cascade Design Automation	.6	.0	.4	0	.1%	.0%	.2%	.0%
ACTEL	.5	.0	.5	0	.1%	.0%	.2%	.0%
ISDATA	.4	.0	.4	0	.1%	.0%	.2%	.0%
National Semiconductor	.4	.1	.4	5	.1%	.0%	.2%	.0%
Technische Computer Systeme	.4	.1	.3	11	.1%	.0%	.2%	.1%
Pacific Numerics	.4	.0	.4	0	.1%	.0%	.2%	.0%
Compact Software	.4	.0	.4	0	.1%	.0%	.2%	.0%
Data I/O	.3	.0	.3	0	.1%	.0%	.2%	.0%
Xilinx	.3	.0	.3	0	.1%	.0%	.1%	.0%

(Continued)

Table 15 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Motorola	.3	.0	.3	0	.0%	.0%	.1%	.0%
ALS Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Inca	.2	.2	.0	1	.0%	.1%	.0%	.0%
CAD Language Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Ontos	.2	.0	.2	0	.0%	.0%	.1%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.1%	.0%
Microsim	.2	.0	.2	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.1%	.0%
Everex Systems	.1	.1	.0	13	.0%	.0%	.0%	.1%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	606.3	226.6	225.7	14,930	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	512.9	207.6	165.0	14,393	84.6%	91.6%	73.1%	96.4%
All Asian-Based Companies	1.0	.4	.6	6	.2%	.2%	.3%	.0%
All European-Based Companies	92.4	18.6	60.1	532	15.2%	8.2%	26.6%	3.6%
All Hardware Companies	193.9	157.9	.0	12,443	32.0%	69.7%	.0%	83.3%
All Turnkey & SW Companies	412.4	68.7	225.7	2,487	68.0%	30.3%	100.0%	16.7%

Source: Dataquest (September 1992)

Table 16
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	64.3	44.3	.0	0	57.0%	57.0%	.0%	.0%
IBM	16.1	8.7	4.3	193	14.3%	11.2%	47.3%	16.2%
Teradyne	1.8	.2	1.1	1	1.6%	.3%	12.0%	.1%
Intergraph	1.5	.7	.2	20	1.3%	.9%	2.3%	1.7%
Cadence	1.4	.0	.9	0	1.2%	.0%	10.1%	.0%
Aucotec	.6	.1	.4	2	.5%	.1%	4.0%	.2%
LSI Logic	.4	.1	.3	1	.4%	.1%	3.7%	.1%
Genrad	.3	.1	.2	1	.3%	.1%	2.6%	.1%
debis Systemhaus	.3	.1	.2	2	.3%	.1%	2.2%	.1%
EEsof	.3	.0	.3	0	.3%	.0%	2.9%	.0%
Compact Software	.2	.0	.2	0	.2%	.0%	2.4%	.0%
Analogy	.2	.0	.2	0	.2%	.0%	2.1%	.0%
COMPASS Design Automation-VLSI	.2	.1	.2	0	.1%	.2%	2.1%	.0%
ISDATA	.2	.0	.1	0	.1%	.0%	1.6%	.0%
Test Systems Strategies	.1	.0	.1	0	.1%	.0%	1.3%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.1%	.0%	1.0%	.0%
Logic Automation	.1	.0	.1	0	.1%	.0%	.8%	.0%
Data I/O	.1	.0	.1	0	.1%	.0%	.7%	.0%
Electrical Eng. Software	.1	.0	.1	0	.1%	.0%	.6%	.0%
DECAD	.0	.0	.0	1	.0%	.0%	.1%	.1%
Microsim	.0	.0	.0	0	.0%	.0%	.2%	.0%
Meta-Software	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 16 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Host-Dependent
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	24.6	23.4	.0	966	21.8%	30.1%	.0%	81.4%
All Companies	112.7	77.8	9.0	1,187	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	111.6	77.6	8.3	1,183	99.0%	99.8%	92.1%	99.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.1	.2	.7	4	1.0%	.2%	7.9%	.4%
All Hardware Companies	88.9	67.7	.0	966	78.9%	87.1%	.0%	81.4%
All Turnkey & SW Companies	23.8	10.1	9.0	221	21.1%	12.9%	100.0%	18.6%

Source: Dataquest (September 1992)

Table 17

1991 CAD/CAM/CAE/EMS Final Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	30.1	20.7	.0	248	47.2%	45.9%	.0%	21.4%
Sun Microsystems	15.3	12.5	.0	368	24.1%	27.7%	.0%	31.7%
Zycad	4.5	2.3	1.2	34	7.1%	5.2%	36.4%	3.0%
Solbourne	2.8	2.8	.0	141	4.4%	6.1%	.0%	12.2%
Ikos Systems	2.6	2.6	.0	12	4.1%	5.8%	.0%	1.1%
Hewlett-Packard	2.5	2.0	.0	193	4.0%	4.5%	.0%	16.6%
Intergraph	2.4	1.2	.6	34	3.8%	2.7%	17.3%	2.9%
Cadence	2.0	.0	1.4	0	3.2%	.0%	40.3%	.0%
IBM	1.1	.8	.2	122	1.7%	1.8%	4.5%	10.5%
Racal-Redac	.2	.2	.0	9	.3%	.4%	.0%	.8%
MacNeal-Schwendler	.1	.0	.1	0	.1%	.0%	1.5%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	63.7	45.2	3.4	1,161	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	63.5	45.0	3.4	1,152	99.7%	99.6%	100.0%	99.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.2	.0	9	.3%	.4%	.0%	.8%
All Hardware Companies	53.9	41.1	.0	1,081	84.6%	91.0%	.0%	93.2%
All Turnkey & SW Companies	9.8	4.1	3.4	79	15.4%	9.0%	100.0%	6.8%

Source: Dataquest (September 1992)

Table 18
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware		Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	50.2	50.2	.0	9,781	41.8%	25.0%	41.8%	.0%	39.3%
IBM	24.7	23.5	.0	5,872	19.6%	12.3%	19.6%	.0%	23.6%
Hewlett-Packard	21.2	16.9	.0	3,638	14.1%	10.6%	14.1%	.0%	14.6%
HPK	12.0	7.8	3.0	520	6.5%	6.0%	6.5%	4.5%	2.1%
Autodesk	8.9	.0	8.9	0	.0%	4.4%	.0%	13.2%	.0%
Aucotec	7.9	1.3	5.1	328	1.1%	3.9%	1.1%	7.6%	1.3%
Kloeckner-Moeller	5.4	1.1	3.8	44	.9%	2.7%	.9%	5.7%	.2%
Orcad	4.9	.0	4.9	0	.0%	2.5%	.0%	7.3%	.0%
Apple Computer	4.8	4.2	.0	1,009	3.5%	2.4%	3.5%	.0%	4.1%
Ziegler Informatics	4.7	.0	4.7	0	.0%	2.4%	.0%	7.0%	.0%
Altera	3.7	.0	3.1	0	.0%	1.8%	.0%	4.6%	.0%
Xilinx	2.9	.0	2.6	0	.0%	1.5%	.0%	3.9%	.0%
Viewlogic Systems	2.9	.0	2.3	0	.0%	1.4%	.0%	3.3%	.0%
Research Machines	2.9	2.9	.0	460	2.4%	1.4%	2.4%	.0%	1.8%
Racal-Redac	2.7	.0	2.7	0	.0%	1.4%	.0%	4.1%	.0%
EEsof	2.7	.0	2.5	0	.0%	1.4%	.0%	3.6%	.0%
CADAM	2.5	.6	1.6	120	.5%	1.2%	.5%	2.4%	.5%
ALS Design	2.4	.0	2.4	0	.0%	1.2%	.0%	3.5%	.0%
BETRONEX	2.1	.2	1.8	39	.2%	1.0%	.2%	2.7%	.2%
CAD-UL	2.1	.0	2.1	0	.0%	1.0%	.0%	3.1%	.0%
PADS Software	2.1	.0	1.7	0	.0%	1.0%	.0%	2.6%	.0%
ACTEL	2.0	.0	1.8	0	.0%	1.0%	.0%	2.7%	.0%
Cadiron	1.6	.8	.6	25	.7%	.8%	.7%	1.0%	.1%
Data I/O	1.6	.0	1.6	0	.0%	.8%	.0%	2.4%	.0%

(Continued)

Table 18 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dell Computer	1.5	1.5	.0	387	.8%	1.3%	.0%	1.6%
Microsim	1.5	.0	1.4	0	.8%	.0%	2.1%	.0%
ISDATA	1.4	.0	1.2	0	.7%	.0%	1.8%	.0%
Aucos elektronische Geräte	1.2	.4	.8	116	.6%	.3%	1.2%	.5%
Serbi	1.1	.0	1.1	0	.5%	.0%	1.6%	.0%
Harris EDA	.8	.0	.6	0	.4%	.0%	.8%	.0%
DAT Standard Info systems	.8	.0	.7	0	.4%	.0%	1.1%	.0%
Number One Systems	.7	.1	.6	54	.4%	.1%	.8%	.2%
Everex Systems	.6	.6	.0	275	.3%	.5%	.0%	1.1%
Teradyne	.6	.0	.5	0	.3%	.0%	.7%	.0%
ALDEC	.5	.0	.5	0	.2%	.0%	.7%	.0%
Inca	.5	.5	.0	2	.2%	.4%	.0%	.0%
Massteck	.4	.0	.4	0	.2%	.0%	.7%	.0%
Accel Technologies	.4	.0	.4	0	.2%	.0%	.5%	.0%
debis Systemhaus	.3	.1	.2	6	.2%	.1%	.3%	.0%
Omaton	.3	.0	.3	0	.2%	.0%	.5%	.0%
Compact Software	.3	.0	.3	0	.2%	.0%	.5%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.3%	.0%
Tanner Research	.2	.0	.2	0	.1%	.0%	.3%	.0%
Technische Computer Systeme	.2	.0	.1	5	.1%	.0%	.2%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Vamp	.1	.0	.1	0	.1%	.0%	.2%	.0%
Olivetti	.1	.1	.0	17	.0%	.1%	.0%	.1%
Masta Corporation	.1	.0	.1	0	.0%	.0%	.1%	.0%

(Continued)

Table 18 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Genrad	.1	.0	.1	4	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.1%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Pacific Numerics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	7.2	7.2	.0	2,184	3.6%	6.0%	.0%	8.8%
All Companies	200.4	119.9	67.3	24,878	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	150.0	104.7	36.1	23,262	74.9%	87.3%	53.5%	93.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	50.3	15.3	31.3	1,616	25.1%	12.7%	46.5%	6.5%
All Hardware Companies	117.1	111.0	.0	24,203	58.4%	92.5%	.0%	97.3%
All Turnkey & SW Companies	83.3	8.9	67.3	675	41.6%	7.5%	100.0%	2.7%

Source: Dataquest (September 1992)

Table 19
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	124.6	107.2	.0	6,832	12.6%	23.3%	.0%	25.5%
Zuken	97.1	38.9	58.3	567	9.8%	8.4%	14.3%	2.1%
Mentor Graphics	91.1	26.4	33.7	876	9.2%	5.7%	8.3%	3.3%
Cadence	81.4	.0	81.4	0	8.2%	.0%	20.0%	.0%
Fujitsu	75.3	51.1	16.7	1,694	7.6%	11.1%	4.1%	6.3%
NEC	58.2	38.3	15.3	4,198	5.9%	8.3%	3.7%	15.7%
Uchida Yoko	36.8	34.9	1.8	584	3.7%	7.6%	.4%	2.2%
Wacom	36.6	7.3	25.5	603	3.7%	1.6%	6.3%	2.3%
Valid	36.0	.0	29.5	0	3.6%	.0%	7.2%	.0%
Sharp System Products—NO OEM	31.2	16.2	15.0	186	3.1%	3.5%	3.7%	.7%
Seiko Instruments—NO OEM	30.6	13.2	14.0	188	3.1%	2.9%	3.4%	.7%
Hewlett-Packard	30.0	24.7	.0	3,204	3.0%	5.4%	.0%	12.0%
Digital	27.3	17.9	1.1	252	2.8%	3.9%	.3%	.9%
IBM	26.9	20.1	3.5	3,409	2.7%	4.4%	.9%	12.7%
CADIX	22.6	9.0	11.3	166	2.3%	2.0%	2.8%	.6%
Racal-Redac	20.6	.0	15.8	0	2.1%	.0%	3.9%	.0%
Intergraph	17.1	3.9	6.4	139	1.7%	.8%	1.6%	.5%
Toshiba—NO OEM	11.6	5.8	4.6	131	1.2%	1.3%	1.1%	.5%
Hitachi	9.0	4.3	3.8	264	.9%	.9%	.9%	1.0%
Viewlogic Systems	8.2	.0	6.4	0	.8%	.0%	1.6%	.0%
Synopsys	8.0	.0	6.0	0	.8%	.0%	1.5%	.0%
CADAM	6.7	1.5	4.4	300	.7%	.3%	1.1%	1.1%
Zycad	6.0	3.1	1.6	46	.6%	.7%	.4%	.2%
COMPASS Design Automation-VLSI	5.8	.3	4.5	8	.6%	.1%	1.1%	.0%

(Continued)

Table 19 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Harris EDA	4.9	.7	2.7	24	.5%	.1%	.7%	.1%
Tokyo Electron—NO OEM	4.7	1.6	2.3	18	.5%	.3%	.6%	.1%
EEsof	4.5	.0	4.0	3	.5%	.0%	1.0%	.0%
Silvar-Lisco	4.5	.0	2.5	0	.5%	.0%	.6%	.0%
Quickturn Systems	3.5	3.5	.0	28	.4%	.8%	.0%	.1%
Sony	3.3	2.9	.0	191	.3%	.6%	.0%	.7%
Compaq	3.3	3.3	.0	638	.3%	.7%	.0%	2.4%
Century Research Center	2.9	1.6	1.1	18	.3%	.3%	.3%	.1%
Xilinx	2.7	.0	2.4	0	.3%	.0%	.6%	.0%
Data I/O	2.6	.0	2.6	0	.3%	.0%	.6%	.0%
Ikos Systems	2.6	2.6	.0	12	.3%	.6%	.0%	.0%
Autodesk	2.5	.0	2.5	0	.3%	.0%	.6%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.2%	.0%	.5%	.0%
Computervision	2.2	.9	1.0	21	.2%	.2%	.2%	.1%
PADS Software	2.2	.0	1.9	0	.2%	.0%	.5%	.0%
Apple Computer	2.0	1.8	.0	427	.2%	.4%	.0%	1.6%
ACTEL	1.9	.0	1.8	0	.2%	.0%	.4%	.0%
Sumitomo Denko Workstation	1.8	1.8	.0	100	.2%	.4%	.0%	.4%
LSI Logic	1.8	.2	1.3	4	.2%	.0%	.3%	.0%
Cascade Design Automation	1.7	.0	1.2	0	.2%	.0%	.3%	.0%
Meta-Software	1.6	.0	1.4	0	.2%	.0%	.3%	.0%
Comdisco Systems	1.5	.0	1.3	0	.1%	.0%	.3%	.0%
Solbourne	1.4	1.4	.0	131	.1%	.3%	.0%	.5%
Logic Automation	1.4	.0	1.4	0	.1%	.0%	.3%	.0%

(Continued)

Table 19 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Teradyne	1.4	.2	.9	3	.1%	.0%	.2%	.0%
Altera	1.4	.0	1.2	0	.1%	.0%	.3%	.0%
LPKF	1.4	.9	.3	59	.1%	.2%	.1%	.2%
Omron	1.4	1.2	.1	39	.1%	.3%	.0%	.1%
Test Systems Strategies	1.2	.0	1.1	0	.1%	.0%	.3%	.0%
Integrated Silicon Systems	1.1	.2	.9	7	.1%	.0%	.2%	.0%
Analogy	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.1%	.0%	.2%	.0%
Microsim	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
BETRONEX	.9	.1	.8	17	.1%	.0%	.2%	.1%
Compact Software	.9	.0	.9	0	.1%	.0%	.2%	.0%
Cooper & Chyan Technology	.7	.0	.7	0	.1%	.0%	.2%	.0%
Quantic Laboratories	.6	.0	.5	0	.1%	.0%	.1%	.0%
I-Logix	.6	.0	.6	0	.1%	.0%	.1%	.0%
Electrical Eng. Software	.5	.0	.5	0	.1%	.0%	.1%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.0%	.0%	.1%	.0%
Andor	.4	.1	.2	3	.0%	.0%	.1%	.0%
EPIC Design Technology	.4	.0	.3	0	.0%	.0%	.1%	.0%
Accel Technologies	.3	.0	.2	0	.0%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
Everex Systems	.2	.2	.0	86	.0%	.0%	.0%	.3%
Object Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
ALDEC	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 19 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Tanner Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Motorola	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Massteck	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.0%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
Ormaton	.0	.0	.0	0	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	12.0	11.6	.0	1,264	1.2%	2.5%	.0%	4.7%
All Companies	992.4	460.5	407.5	26,742	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	546.1	231.5	220.4	17,713	55.0%	50.3%	54.1%	66.2%
All Asian-Based Companies	423.4	228.1	170.0	8,953	42.7%	49.5%	41.7%	33.5%
All European-Based Companies	22.9	1.0	17.0	77	2.3%	.2%	4.2%	.3%
All Hardware Companies	225.7	193.1	.0	16,660	22.7%	41.9%	.0%	62.3%
All Turnkey & SW Companies	766.7	267.4	407.5	10,082	77.3%	58.1%	100.0%	37.7%

Source: Dataquest (September 1992)

Table 20
1991 CAD/CAM/CAE/EDA Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	109.5	94.8	.0	6,357	14.8%	29.6%	.0%	46.1%
Zuken	97.1	38.9	58.3	567	13.1%	12.1%	17.8%	4.1%
Mentor Graphics	91.1	26.4	33.7	876	12.3%	8.3%	10.3%	6.4%
Cadence	72.9	.0	72.9	0	9.8%	.0%	22.2%	.0%
Uchida Yoko	36.8	34.9	1.8	584	5.0%	10.9%	.6%	4.2%
NEC	36.6	20.1	13.5	1,146	4.9%	6.3%	4.1%	8.3%
Valid	36.0	.0	29.5	0	4.9%	.0%	9.0%	.0%
Fujitsu	30.9	20.9	6.9	748	4.2%	6.5%	2.1%	5.4%
Seiko Instruments—NO OEM	27.3	11.7	12.8	175	3.7%	3.7%	3.9%	1.3%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	3.7%	4.4%	4.0%	1.2%
CADIX	22.6	9.0	11.3	166	3.0%	2.8%	3.4%	1.2%
Hewlett-Packard	21.2	17.7	.0	1,824	2.9%	5.5%	.0%	13.2%
Racal-Redac	20.6	.0	15.8	0	2.8%	.0%	4.8%	.0%
Intergraph	16.4	3.6	6.3	126	2.2%	1.1%	1.9%	.9%
Toshiba—NO OEM	11.6	5.8	4.6	131	1.6%	1.8%	1.4%	1.0%
Synopsys	8.0	.0	6.0	0	1.1%	.0%	1.8%	.0%
Digital	5.8	3.3	.8	198	.8%	1.0%	.2%	1.4%
COMPASS Design Automation-VLSI	5.7	.2	4.4	7	.8%	.1%	1.3%	.1%
Tokyo Electron—NO OEM	4.7	1.6	2.3	18	.6%	.5%	.7%	.1%
Harris EDA	4.7	.6	2.5	22	.6%	.2%	.8%	.2%
Hitachi	4.5	2.2	1.9	89	.6%	.7%	.6%	.6%
Silvar-Lisco	4.5	.0	2.5	0	.6%	.0%	.7%	.0%
Viewlogic Systems	3.8	.0	2.9	0	.5%	.0%	.9%	.0%
Quickturn Systems	3.5	3.5	.0	28	.5%	1.1%	.0%	.2%

(Continued)

Table 20 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sony	3.3	2.9	.0	191	.4%	.9%	.0%	1.4%
Century Research Center	2.9	1.6	1.1	18	.4%	.5%	.3%	.1%
EEsof	2.6	.0	2.3	3	.4%	.0%	.7%	.0%
Wacom	2.5	.6	1.9	25	.3%	.2%	.6%	.2%
Contec Microelectronics	2.4	.0	2.2	0	.3%	.0%	.7%	.0%
Computervision	2.2	.9	1.0	21	.3%	.3%	.3%	.2%
IBM	2.1	1.2	.5	59	.3%	.4%	.2%	.4%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.2%	.5%	.0%	.7%
Cascade Design Automation	1.7	.0	1.2	0	.2%	.0%	.4%	.0%
LSI Logic	1.6	.2	1.2	4	.2%	.0%	.4%	.0%
Comdisco Systems	1.5	.0	1.3	0	.2%	.0%	.4%	.0%
Logic Automation	1.4	.0	1.4	0	.2%	.0%	.4%	.0%
Meta-Software	1.4	.0	1.2	0	.2%	.0%	.4%	.0%
Omron	1.4	1.2	.1	39	.2%	.4%	.0%	.3%
Test Systems Strategies	1.1	.0	1.0	0	.2%	.0%	.3%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.1%	.0%	.3%	.0%
Analogy	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Integrated Silicon Systems	.9	.1	.8	4	.1%	.0%	.2%	.0%
Cooper & Chyan Technology	.7	.0	.7	0	.1%	.0%	.2%	.0%
Teradyne	.7	.1	.4	2	.1%	.0%	.1%	.0%
Quantic Laboratories	.6	.0	.5	0	.1%	.0%	.2%	.0%
i-Logix	.6	.0	.6	0	.1%	.0%	.2%	.0%
Data I/O	.5	.0	.5	0	.1%	.0%	.1%	.0%
Solbourne	.4	.4	.0	81	.1%	.1%	.0%	.6%

(Continued)

Table 20 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ACTEL	.4	.0	.4	0	.1%	.0%	.1%	.0%
Compact Software	.4	.0	.4	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.4	.0	.3	0	.0%	.0%	.1%	.0%
EPIC Design Technology	.4	.0	.3	0	.0%	.0%	.1%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.0%	.0%	.1%	.0%
Xilinx	.3	.0	.2	0	.0%	.0%	.1%	.0%
Autodesk	.3	.0	.3	0	.0%	.0%	.1%	.0%
SIMUCAD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Object Design	.2	.0	.2	0	.0%	.0%	.1%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.0%	.0%
Motorola	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	2	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	4	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 20 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	741.7	320.0	328.2	13,776	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	410.3	152.9	182.8	9,618	55.3%	47.8%	55.7%	69.8%
All Asian-Based Companies	310.9	167.1	129.5	4,157	41.9%	52.2%	39.5%	30.2%
All European-Based Companies	20.6	.0	15.9	1	2.8%	.0%	4.8%	.0%
All Hardware Companies	144.2	124.1	.0	8,774	19.4%	38.8%	.0%	63.7%
All Turnkey & SW Companies	597.5	195.9	328.2	5,002	80.6%	61.2%	100.0%	36.3%

Source: Dataquest (September 1992)

Table 21
1991 CAD/CAM/CAB/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	32.4	22.0	7.2	546	42.4%	45.5%	43.3%	50.7%
Digital	14.7	10.0	.2	0	19.2%	20.7%	1.2%	.0%
IBM	10.9	5.9	2.9	153	14.3%	12.2%	17.4%	14.2%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	4.3%	2.9%	6.7%	1.2%
Cadence	2.8	.0	2.8	0	3.7%	.0%	16.9%	.0%
Hitachi	1.4	.7	.6	24	1.9%	1.4%	3.6%	2.2%
Teradyne	.6	.1	.4	0	.7%	.2%	2.1%	.0%
Intergraph	.3	.1	.0	5	.3%	.2%	.2%	.4%
Harris EDA	.3	.1	.2	2	.3%	.1%	1.1%	.2%
Compact Software	.2	.0	.2	0	.3%	.0%	1.3%	.0%
Meta-Software	.2	.0	.2	0	.2%	.0%	1.0%	.0%
LSI Logic	.2	.0	.1	0	.2%	.0%	.8%	.0%
EEsof	.2	.0	.2	0	.2%	.0%	1.0%	.0%
Electrical Eng. Software	.2	.0	.1	0	.2%	.0%	.8%	.0%
Test Systems Strategies	.1	.0	.1	0	.2%	.0%	.7%	.0%
COMPASS Design Automation—VLSI	.1	.1	.1	0	.1%	.2%	.7%	.0%
Data I/O	.1	.0	.1	0	.1%	.0%	.5%	.0%
Analogy	.1	.0	.1	0	.1%	.0%	.3%	.0%
Logic Automation	.0	.0	.0	0	.0%	.0%	.2%	.0%
Kubota Computer	.0	.0	.0	1	.0%	.0%	.0%	.1%
Microsim	.0	.0	.0	0	.0%	.0%	.1%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 21 (Continued)

1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation

Platform: Host-Dependent

Region: Asia

Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	8.5	8.0	.0	332	11.1%	16.6%	.0%	30.9%
All Companies	76.4	48.3	16.6	1,076	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	39.3	24.2	7.7	492	51.4%	50.2%	46.4%	45.8%
All Asian-Based Companies	37.1	24.1	8.9	583	48.6%	49.8%	53.6%	54.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	22.9	18.0	.0	332	30.0%	37.3%	.0%	30.9%
All Turnkey & SW Companies	53.5	30.3	16.6	744	70.0%	62.7%	100.0%	69.1%

Source: Dataquest (September 1992)

Table 22
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	15.2	12.4	.0	474	35.0%	45.4%	.0%	59.4%
Digital	6.8	4.7	.0	54	15.6%	17.1%	.0%	6.8%
Zycad	6.0	3.1	1.6	46	13.9%	11.4%	17.2%	5.8%
Cadence	5.7	.0	5.7	0	13.1%	.0%	60.1%	.0%
Sharp System Products—NO OEM	4.1	2.1	1.9	18	9.4%	7.7%	20.6%	2.2%
Ikos Systems	2.6	2.6	.0	12	6.0%	9.6%	.0%	1.5%
Solbourne	1.0	1.0	.0	49	2.3%	3.7%	.0%	6.2%
Hewlett-Packard	.8	.6	.0	60	1.8%	2.2%	.0%	7.5%
IBM	.7	.5	.1	66	1.5%	1.7%	1.0%	8.2%
Intergraph	.4	.2	.1	8	1.0%	.6%	1.0%	1.0%
Sumitomo Denko Workstation	.1	.1	.0	11	.3%	.5%	.0%	1.3%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	43.3	27.3	9.4	798	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	39.1	25.0	7.5	769	90.3%	91.8%	79.4%	96.4%
All Asian-Based Companies	4.2	2.2	1.9	29	9.7%	8.2%	20.6%	3.6%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	26.7	21.7	.0	724	61.8%	79.5%	.0%	90.8%
All Turnkey & SW Companies	16.6	5.6	9.4	74	38.2%	20.5%	100.0%	9.2%

Source: Dataquest (September 1992)

Table 23
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Wacom	34.2	6.7	23.7	578	26.1%	10.4%	44.5%	5.2%
NEC	21.6	18.2	1.7	3,052	16.5%	28.0%	3.2%	27.5%
IBM	13.2	12.5	.0	3,131	10.1%	19.3%	.0%	28.2%
Fujitsu	12.1	8.2	2.7	400	9.2%	12.6%	5.0%	3.6%
Hewlett-Packard	8.1	6.4	.0	1,320	6.2%	9.9%	.0%	11.9%
CADAM	6.7	1.5	4.4	300	5.1%	2.3%	8.3%	2.7%
Viewlogic Systems	4.4	.0	3.5	0	3.4%	.0%	6.5%	.0%
Compaq	3.3	3.3	.0	638	2.5%	5.0%	.0%	5.8%
Hitachi	3.1	1.5	1.3	151	2.3%	2.3%	2.4%	1.4%
Xilinx	2.4	.0	2.2	0	1.9%	.0%	4.1%	.0%
Autodesk	2.2	.0	2.2	0	1.7%	.0%	4.2%	.0%
PADS Software	2.2	.0	1.9	0	1.7%	.0%	3.5%	.0%
Data I/O	2.1	.0	2.1	0	1.6%	.0%	3.9%	.0%
Apple Computer	2.0	1.8	.0	427	1.6%	2.8%	.0%	3.8%
EEsof	1.7	.0	1.5	0	1.3%	.0%	2.9%	.0%
ACTEL	1.6	.0	1.4	0	1.2%	.0%	2.6%	.0%
Altera	1.4	.0	1.2	0	1.0%	.0%	2.2%	.0%
LPKF	1.4	.9	.3	59	1.0%	1.4%	.6%	.5%
BETRONEX	.9	.1	.8	17	.7%	.1%	1.6%	.2%
Microsim	.9	.0	.9	0	.7%	.0%	1.6%	.0%
Andor	.4	.1	.2	3	.3%	.1%	.5%	.0%
Compact Software	.3	.0	.3	0	.2%	.0%	.6%	.0%
Accel Technologies	.3	.0	.2	0	.2%	.0%	.4%	.0%
Integrated Silicon Systems	.2	.1	.1	3	.2%	.1%	.2%	.0%

(Continued)

Table 23 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Teradyne	.2	.0	.2	0	.2%	.0%	.3%	.0%
Everex Systems	.2	.2	.0	82	.1%	.3%	.0%	.7%
ALDEC	.1	.0	.1	0	.1%	.0%	.2%	.0%
Digital	.1	.0	.1	0	.1%	.0%	.2%	.0%
Tanner Research	.1	.0	.1	0	.1%	.0%	.1%	.0%
Massteck	.1	.0	.1	0	.0%	.0%	.1%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.1%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.1%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Oration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	3.5	3.5	.0	932	2.7%	5.5%	.0%	8.4%
All Companies	130.9	64.9	53.3	11,093	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	57.4	29.3	22.5	6,833	43.8%	45.1%	42.2%	61.6%
All Asian-Based Companies	71.3	34.6	29.6	4,184	54.4%	53.4%	55.6%	37.7%
All European-Based Companies	2.3	1.0	1.2	76	1.7%	1.5%	2.2%	.7%
All Hardware Companies	31.8	29.2	.0	6,830	24.3%	45.0%	.0%	61.6%
All Turnkey & SW Companies	99.1	35.7	53.3	4,263	75.7%	55.0%	100.0%	38.4%

Source: Dataquest (September 1992)

Table 24 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
LPKF	.2	.1	.0	7	.4%	.4%	.5%	.2%
Royal Digital Systems	.1	.0	.1	0	.3%	.0%	1.4%	.0%
Teradyne	.1	.0	.1	0	.3%	.0%	1.1%	.0%
Spectrum Software	.1	.0	.1	0	.2%	.0%	1.2%	.0%
Number One Systems	.1	.0	.1	4	.1%	.0%	.6%	.1%
Accel Technologies	.1	.0	.1	0	.1%	.0%	.6%	.0%
Massteck	.1	.0	.1	0	.1%	.0%	.6%	.0%
Capilano Computing	.1	.0	.1	0	.1%	.0%	.6%	.0%
Ziegler Informatics	.0	.0	.0	0	.1%	.0%	.4%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	4.9	4.7	.0	463	12.1%	17.6%	.0%	15.1%
All Companies	40.6	26.7	8.5	3,074	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	39.4	26.4	7.6	3,051	97.0%	98.6%	90.1%	99.3%
All Asian-Based Companies	.5	.2	.3	3	1.3%	.8%	3.7%	.1%
All European-Based Companies	.7	.2	.5	19	1.7%	.6%	6.3%	.6%
All Hardware Companies	29.8	25.5	.0	3,023	73.4%	95.5%	.0%	98.3%
All Turnkey & SW Companies	10.8	1.2	8.5	51	26.6%	4.5%	100.0%	1.7%

Source: Dataquest (September 1992)

Table 25
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	4.3	3.7	.0	285	32.8%	49.0%	.0%	41.3%
Hewlett-Packard	2.4	2.0	.0	275	18.3%	26.1%	.0%	39.9%
Digital	1.6	1.1	.0	67	12.1%	14.4%	.0%	9.6%
LSI Logic	.8	.1	.6	2	6.1%	1.1%	17.8%	.3%
Genrad	.7	.1	.5	7	5.2%	1.7%	13.6%	.9%
COMPASS Design Automation-VLSI	.6	.0	.5	1	4.6%	.4%	13.9%	.1%
Zuken	.5	.2	.3	3	4.0%	2.8%	9.4%	.4%
Analogy	.5	.0	.5	0	3.9%	.0%	13.6%	.0%
Intergraph	.4	.2	.1	6	2.9%	2.7%	2.1%	.8%
Comdisco Systems	.3	.0	.3	0	2.2%	.0%	7.9%	.0%
Computervision	.3	.1	.1	3	2.1%	1.3%	2.4%	.4%
EEsof	.2	.0	.2	0	1.9%	.0%	6.0%	.0%
Compact Software	.2	.0	.2	0	1.2%	.0%	4.5%	.0%
Royal Digital Systems	.1	.0	.1	0	1.0%	.0%	3.6%	.0%
IBM	.1	.0	.0	2	.5%	.5%	.6%	.3%
ACTEL	.1	.0	.1	0	.5%	.0%	1.8%	.0%
Data I/O	.1	.0	.1	0	.5%	.0%	1.8%	.0%
Autodesk	.0	.0	.0	0	.2%	.0%	.6%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.1%	.0%	.3%	.0%

(Continued)

Table 25 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	40	.0%	.0%	.0%	5.7%
All Companies	12.9	7.5	3.3	690	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	12.4	7.3	3.0	687	96.0%	97.2%	90.6%	99.6%
All Asian-Based Companies	.5	.2	.3	3	4.0%	2.8%	9.4%	.4%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	8.2	6.7	.0	666	63.3%	89.5%	.0%	96.6%
All Turnkey & SW Companies	4.8	.8	3.3	24	36.7%	10.5%	100.0%	3.4%

Source: Dataquest (September 1992)

Table 26
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
Platform: Host-Dependent
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	4.8	3.3	.0	0	50.3%	45.5%	.0%	.0%
IBM	.4	.2	.1	5	3.7%	2.5%	22.0%	3.1%
LSI Logic	.1	.0	.1	0	.9%	.1%	14.6%	.1%
Compact Software	.1	.0	.1	0	.9%	.0%	22.0%	.0%
Genrad	.1	.0	.1	0	.8%	.1%	12.2%	.1%
Teradyne	.1	.0	.1	0	.8%	.0%	14.6%	.0%
Intergraph	.1	.0	.0	1	.5%	.1%	2.4%	.3%
Analogy	.0	.0	.0	0	.3%	.0%	4.9%	.0%
EEsof	.0	.0	.0	0	.2%	.0%	2.4%	.0%
COMPASS Design Automation-VLSI	.0	.0	.0	0	.1%	.1%	2.4%	.0%
Data I/O	.0	.0	.0	0	.1%	.0%	2.4%	.0%
Other Companies	4.0	3.8	.0	155	41.2%	51.5%	.0%	96.3%
All Companies	9.6	7.3	.4	161	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	9.6	7.3	.4	161	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	8.8	7.1	.0	155	91.5%	97.0%	.0%	96.3%
All Turnkey & SW Companies	.8	.2	.4	6	8.5%	3.0%	100.0%	3.7%

Source: Dataquest (September 1992)

Table 27
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	2.3	1.6	.0	18	71.0%	68.3%	.0%	19.0%
Sun Microsystems	.6	.5	.0	28	18.6%	21.1%	.0%	29.7%
Hewlett-Packard	.2	.2	.0	14	5.7%	6.6%	.0%	14.4%
Intergraph	.1	.0	.0	1	2.5%	.9%	100.0%	1.1%
IBM	.1	.1	.0	13	2.2%	3.1%	.0%	14.0%
Other Companies	.0	.0	.0	21	.0%	.0%	.0%	21.9%
All Companies	3.2	2.3	.0	96	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.2	2.3	.0	96	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.1	2.2	.0	95	97.2%	98.7%	.0%	98.8%
All Turnkey & SW Companies	.1	.0	.0	1	2.8%	1.3%	100.0%	1.2%

Source: Dataquest (September 1992)

Table 28
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	5.5	5.5	.0	1,063	36.6%	56.4%	.0%	50.0%
IBM	2.8	2.6	.0	652	18.5%	27.0%	.0%	30.7%
Orcad	1.8	.0	1.8	0	12.4%	.0%	38.8%	.0%
Altera	.7	.0	.6	0	4.6%	.0%	12.2%	.0%
BETRONEX	.5	.1	.4	9	3.1%	.5%	8.6%	.4%
Hewlett-Packard	.4	.3	.0	106	2.9%	3.5%	.0%	5.0%
Xilinx	.3	.0	.3	0	2.2%	.0%	6.1%	.0%
Data I/O	.3	.0	.3	0	1.9%	.0%	5.9%	.0%
ACTEL	.3	.0	.2	0	1.7%	.0%	4.9%	.0%
PADS Software	.3	.0	.2	0	1.7%	.0%	4.4%	.0%
Autodesk	.2	.0	.2	0	1.3%	.0%	4.2%	.0%
Apple Computer	.2	.2	.0	39	1.2%	1.7%	.0%	1.8%
EEsof	.2	.0	.1	0	1.1%	.0%	3.0%	.0%
LPKF	.2	.1	.0	7	1.0%	1.0%	.8%	.3%
Compact Software	.1	.0	.1	0	.9%	.0%	2.7%	.0%
Spectrum Software	.1	.0	.1	0	.7%	.0%	2.1%	.0%
Accel Technologies	.1	.0	.1	0	.4%	.0%	1.1%	.0%
Number One Systems	.1	.0	.1	4	.4%	.1%	1.1%	.2%
Capilano Computing	.1	.0	.1	0	.3%	.0%	1.1%	.0%
Massteck	.1	.0	.1	0	.3%	.0%	1.1%	.0%
Teradyne	.0	.0	.0	0	.2%	.0%	.6%	.0%
Ziegler Informatics	.0	.0	.0	0	.2%	.0%	.6%	.0%
Genrad	.0	.0	.0	1	.1%	.0%	.4%	.0%
American Small Business Comp.	.0	.0	.0	0	.1%	.0%	.2%	.0%

(Continued)

Table 28 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.9	.9	.0	247	6.3%	9.7%	.0%	11.6%
All Companies	14.9	9.7	4.7	2,127	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	14.2	9.5	4.2	2,108	95.3%	98.3%	88.8%	99.1%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.2	.5	19	4.7%	1.7%	11.2%	.9%
All Hardware Companies	9.8	9.5	.0	2,107	65.5%	98.3%	.0%	99.0%
All Turnkey & SW Companies	5.1	.2	4.7	20	34.5%	1.7%	100.0%	1.0%

Source: Dataquest (September 1992)

Table 29

1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Units Shipped
Sun Microsystems	215.1	184.6	.0	12,470	12.2%	24.2%
Mentor Graphics	198.1	57.5	73.2	1,904	11.2%	7.5%
Hewlett-Packard	112.2	92.4	.0	12,895	6.4%	12.1%
Digital	105.2	70.2	2.7	1,010	6.0%	9.2%
Cadence	95.2	.0	69.4	0	5.4%	.0%
Valid	89.8	3.0	64.2	353	5.1%	.4%
Intergraph	78.9	21.6	27.4	727	4.5%	2.8%
Compaq	76.9	76.9	.0	14,995	4.4%	10.1%
IBM	47.8	45.4	.0	11,349	2.7%	6.0%
Viewlogic Systems	41.0	.0	32.0	0	2.3%	.0%
Synopsys	40.1	.0	30.1	0	2.3%	.0%
Wacom	36.6	7.3	25.5	603	2.1%	1.0%
NEC	34.2	22.3	9.2	2,387	1.9%	2.9%
Racal-Redac	34.2	.3	28.5	17	1.9%	.0%
Fujitsu	31.0	19.5	8.4	698	1.8%	2.6%
Zycad	30.0	15.6	8.1	230	1.7%	2.0%
Siemens Nixdorf Info systems	21.0	10.5	7.4	309	1.2%	1.4%
Eesof	20.5	.1	18.1	15	1.2%	.0%
COMPASS Design Automation-VLSI	20.5	1.2	16.0	27	1.2%	.2%
Zuken	20.1	8.1	12.1	117	1.1%	1.1%
Autodesk	19.6	.0	19.6	0	1.1%	.0%
Xilinx	18.0	.0	16.2	0	1.0%	.0%
Teradyne	15.8	2.0	10.2	30	.9%	.3%
LSI Logic	15.6	1.6	11.7	39	.9%	.2%

(Continued)

Table 29 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Company	Application: Platform: Region: Units:	Electronic CAE All Platforms Worldwide Millions of U.S. Dollars/Actual Units	Market Share					
			Total		Factory		Hardware	
			Revenue	Hardware Revenue	Revenue	Hardware Revenue	Revenue	Hardware Units Shipped
Logic Automation			14.2	.0	14.2	0	.0%	.0%
Quicknum Systems			14.0	14.0	.0	112	1.8%	.1%
Altera			13.7	.0	11.6	0	.0%	.0%
Ikos Systems			13.1	13.1	.0	61	1.7%	.1%
ACTEL			12.5	.0	11.3	0	.0%	.0%
Aucotec			11.3	1.9	7.3	350	.2%	.5%
Analogy			10.5	.0	9.5	0	.0%	.0%
Harris EDA			10.5	1.1	6.0	45	.1%	.1%
Comdisco Systems			9.8	.0	8.8	0	.0%	.0%
Apple Computer			9.3	8.2	.0	1,940	1.1%	2.6%
Computervision			8.8	3.4	2.4	79	.5%	.1%
Data I/O			8.7	.0	8.7	0	.0%	.0%
Microslim			8.5	.0	8.0	0	.0%	.0%
Genrad			7.7	1.5	5.1	77	.2%	.1%
Ascent Logic Corp			7.5	.0	6.0	0	.0%	.0%
Orcad			7.4	.0	7.4	0	.0%	.0%
Vantage Analysis Systems			7.0	.0	6.0	0	.0%	.0%
Meta-Software			6.8	.0	5.9	0	.0%	.0%
Test Systems Strategies			6.2	.0	5.4	0	.0%	.0%
I-Logix			5.5	.0	5.5	0	.0%	.0%
Kloeckner-Moeller			5.4	1.1	3.8	44	.1%	.1%
AnaCAD			4.5	.0	4.5	0	.0%	.0%
Quad Design Technology			4.3	.0	4.0	0	.0%	.0%
Everex Systems			4.3	4.3	.0	1,758	.6%	2.3%

(Continued)

Table 29 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Solbourne	4.3	4.2	.0	395	.2%	.5%	.0%	.5%
HP Cade	4.2	2.5	1.3	42	.2%	.3%	.2%	.1%
Contec Microelectronics	4.0	.0	3.6	0	.2%	.0%	.5%	.0%
Scientific & Engineering SW	3.5	.0	3.5	0	.2%	.0%	.5%	.0%
EPIC Design Technology	3.5	.0	3.1	0	.2%	.0%	.5%	.0%
Quantic Laboratories	2.9	.0	2.7	0	.2%	.0%	.4%	.0%
Compact Software	2.9	.0	2.9	0	.2%	.0%	.4%	.0%
debis Systemhaus	2.8	.7	1.7	19	.2%	.1%	.2%	.0%
Ziegler Informatics	2.8	.0	2.8	0	.2%	.0%	.4%	.0%
Motorola	2.5	.0	2.5	0	.1%	.0%	.4%	.0%
ALDEC	2.5	.0	2.5	0	.1%	.0%	.4%	.0%
Tokyo Electron—NO OEM	2.2	.7	1.1	8	.1%	.1%	.2%	.0%
Dell Computer	2.2	2.2	.0	553	.1%	.3%	.0%	.7%
ALS Design	2.0	.0	2.0	0	.1%	.0%	.3%	.0%
ISDATA	2.0	.0	1.8	0	.1%	.0%	.3%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.3%	.0%
SIMUCAD	1.7	.0	1.7	0	.1%	.0%	.2%	.0%
Research Machines	1.7	1.7	.0	266	.1%	.2%	.0%	.4%
Caditron	1.6	.8	.6	25	.1%	.1%	.1%	.0%
Century Research Center	1.6	.8	.6	10	.1%	.1%	.1%	.0%
Omron	1.4	1.2	.1	39	.1%	.2%	.0%	.1%
Electrical Eng. Software	1.3	.0	1.2	0	.1%	.0%	.2%	.0%
Ontos	1.3	.0	1.3	0	.1%	.0%	.2%	.0%
Sony	1.2	1.1	.0	70	.1%	.1%	.0%	.1%

(Continued)

Table 29 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share			
					Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cascade Design Automation	1.2	.0	.8	0	.1%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.1%	.0%	.1%	.2%
Serbi	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Spectrum Software	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.1%	.0%	.0%
Phase Three Logic	1.0	.0	.9	0	.1%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.0%	.1%	.1%	.0%
PADS Software	.9	.0	.7	0	.0%	.0%	.1%	.0%
National Semiconductor	.8	.1	.7	8	.0%	.0%	.1%	.0%
Infinite Graphics	.8	.0	.8	0	.0%	.0%	.1%	.0%
DAT Standard Info ssystemes	.8	.0	.7	0	.0%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.0%	.0%	.1%	.0%
CAD Language Systems	.7	.0	.6	0	.0%	.0%	.1%	.0%
Inca	.7	.7	.0	3	.0%	.1%	.0%	.0%
Visionics	.7	.0	.5	3	.0%	.0%	.1%	.0%
Omaton	.7	.0	.7	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.6	.1	.5	17	.0%	.0%	.1%	.0%
Capilano Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
Accel Technologies	.5	.0	.5	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.1%	.0%
PLUS Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
Tanner Research	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
Number One Systems	.4	.1	.3	27	.0%	.0%	.0%	.0%

(Continued)

Table 29 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.0%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.3	.0	.3	0	.0%	.0%	.0%	.0%
Foresight Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	57.0	55.6	.0	8,813	3.2%	7.3%	.0%	11.7%
All Companies	1,763.9	762.6	686.0	75,081	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,536.3	680.4	563.7	69,898	87.1%	89.2%	82.2%	93.1%
All Asian-Based Companies	128.3	61.0	56.9	3,932	7.3%	8.0%	8.3%	5.2%
All European-Based Companies	99.3	21.1	65.4	1,251	5.6%	2.8%	9.5%	1.7%
All Hardware Companies	662.8	575.9	.0	66,957	37.6%	75.5%	.0%	89.2%
All Turnkey & SW Companies	1,101.2	186.6	686.0	8,124	62.4%	24.5%	100.0%	10.8%

Source: Dataquest (September 1992)

Table 30
1991 CAD/CAM/CAB/GE Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	198.1	57.5	73.2	1,904	17.7%	14.8%	14.8%	7.7%
Sun Microsystems	182.8	158.3	.0	11,254	16.3%	40.7%	.0%	45.8%
Valid	89.8	3.0	64.2	353	8.0%	.8%	13.0%	1.4%
Cadence	87.5	.0	63.8	0	7.8%	.0%	12.9%	.0%
Hewlett-Packard	80.9	67.3	.0	7,230	7.2%	17.3%	.0%	29.4%
Intergraph	71.7	18.1	26.0	627	6.4%	4.7%	5.3%	2.6%
Synopsys	40.1	.0	30.1	0	3.6%	.0%	6.1%	.0%
Racal-Redac	31.8	.0	26.4	0	2.8%	.0%	5.3%	.0%
NEC	22.3	12.2	8.2	697	2.0%	3.1%	1.7%	2.8%
Digital	21.2	12.9	2.0	794	1.9%	3.3%	.4%	3.2%
Siemens Nixdorf Info systeme	21.0	10.5	7.4	309	1.9%	2.7%	1.5%	1.3%
Zuken	20.1	8.1	12.1	117	1.8%	2.1%	2.4%	.5%
COMPASS Design Automation-VLSI	20.1	.8	15.5	26	1.8%	.2%	3.1%	.1%
Viewlogic Systems	18.9	.0	14.7	0	1.7%	.0%	3.0%	.0%
LSI Logic	14.0	1.4	10.5	36	1.2%	.4%	2.1%	.1%
Quickturn Systems	14.0	14.0	.0	112	1.2%	3.6%	.0%	.5%
Logic Automation	13.9	.0	13.9	0	1.2%	.0%	2.8%	.0%
Fujitsu	12.7	8.0	3.4	308	1.1%	2.1%	.7%	1.3%
EEsof	11.9	.1	10.3	15	1.1%	.0%	2.1%	.1%
Analogy	10.0	.0	9.0	0	.9%	.0%	1.8%	.0%
Comdisco Systems	9.8	.0	8.8	0	.9%	.0%	1.8%	.0%
Computervision	8.8	3.4	2.4	79	.8%	.9%	.5%	.3%
Harris EDA	8.2	1.0	4.6	40	.7%	.2%	.9%	.2%
Ascent Logic Corp	7.5	.0	6.0	0	.7%	.0%	1.2%	.0%

(Continued)

Table 30 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE		Technical Workstation		Worldwide		Millions of U.S. Dollars/Actual Units											
Company		Total		Hardware		Software		Hardware Units Shipped		Total Factory Revenue		Hardware Revenue		Software Revenue		Hardware Units Shipped	
		Revenue		Revenue		Revenue		Revenue		Revenue		Revenue		Revenue		Revenue	
Teradyne		7.2		1.1		4.6		26		.6%		.3%		.9%		.1%	
Vantage Analysis Systems		7.0		.0		6.0		0		.6%		.0%		1.2%		.0%	
Genrad		6.7		1.3		4.5		65		.6%		.3%		.9%		.3%	
Meta-Software		6.0		.0		5.2		0		.5%		.0%		1.1%		.0%	
Test Systems Strategies		5.6		.0		4.8		0		.5%		.0%		1.0%		.0%	
i-Logix		5.5		.0		5.5		0		.5%		.0%		1.1%		.0%	
AnaCAD		4.5		.0		4.5		0		.4%		.0%		.9%		.0%	
Quad Design Technology		4.3		.0		4.0		0		.4%		.0%		.8%		.0%	
HP Code		4.2		2.5		1.3		42		.4%		.6%		.3%		.2%	
Contec Microelectronics		4.0		.0		3.6		0		.4%		.0%		.7%		.0%	
Scientific & Engineering SW		3.5		.0		3.5		0		.3%		.0%		.7%		.0%	
EPIC Design Technology		3.5		.0		3.1		0		.3%		.0%		.6%		.0%	
Quantic Laboratories		2.9		.0		2.7		0		.3%		.0%		.5%		.0%	
Aucotec		2.8		.5		1.8		20		.3%		.1%		.4%		.1%	
Motorola		2.5		.0		2.5		0		.2%		.0%		.5%		.0%	
ACTEL		2.5		.0		2.3		0		.2%		.0%		.5%		.0%	
Wacom		2.5		.6		1.9		25		.2%		.1%		.4%		.1%	
Tokyo Electron—NO QEM		2.2		.7		1.1		8		.2%		.2%		.2%		.0%	
Autodesk		2.2		.0		2.2		0		.2%		.0%		.4%		.0%	
debis Systemhaus		2.1		.5		1.3		11		.2%		.1%		.3%		.0%	
CAD/CAM Group		1.8		.0		1.8		0		.2%		.0%		.4%		.0%	
Xilinx		1.8		.0		1.6		0		.2%		.0%		.3%		.0%	
Century Research Center		1.6		.8		.6		10		.1%		.2%		.1%		.0%	
Data I/O		1.5		.0		1.5		0		.1%		.0%		.3%		.0%	

(Continued)

(Continued)

Table 30 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Omron	1.4	1.2	.1	39	.1%	.3%	.0%	.2%
SIMUCAD	1.3	.0	1.3	0	.1%	.0%	.3%	.0%
Ontos	1.3	.0	1.3	0	.1%	.0%	.3%	.0%
Sony	1.2	1.1	.0	70	.1%	.3%	.0%	.3%
Solbourne	1.2	1.2	.0	241	.1%	.3%	.0%	1.0%
Cascade Design Automation	1.2	.0	.8	0	.1%	.0%	.2%	.0%
Compact Software	1.2	.0	1.2	0	.1%	.0%	.2%	.0%
Electrical Eng. Software	.9	.0	.8	0	.1%	.0%	.2%	.0%
ISKA	.9	.4	.4	16	.1%	.1%	.1%	.1%
Microsim	.9	.0	.8	0	.1%	.0%	.2%	.0%
National Semiconductor	.8	.1	.6	8	.1%	.0%	.1%	.0%
CAD Language Systems	.7	.0	.6	0	.1%	.0%	.1%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.1%	.0%
Everex Systems	.5	.5	.0	80	.0%	.1%	.0%	.3%
Technische Computer Systeme	.5	.1	.4	12	.0%	.0%	.1%	.0%
ISDATA	.4	.0	.4	0	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.1%	.0%
Phase Three Logic	.3	.0	.2	0	.0%	.0%	.0%	.0%
Inca	.2	.2	.0	1	.0%	.1%	.0%	.0%
ALS Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
Infinite Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 30 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	1,121.7	389.3	494.4	24,575	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	988.9	341.9	422.9	22,891	88.2%	87.8%	85.5%	93.1%
All Asian-Based Companies	63.9	32.7	27.4	1,274	5.7%	8.4%	5.5%	5.2%
All European-Based Companies	68.9	14.7	44.1	410	6.1%	3.8%	8.9%	1.7%
All Hardware Companies	299.3	255.3	.0	19,781	26.7%	65.6%	.0%	80.5%
All Turnkey & SW Companies	822.4	133.9	494.4	4,794	73.3%	34.4%	100.0%	19.5%

Source: Dataquest (September 1992)

Table 31
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	57.2	39.0	.5	0	46.7%	50.1%	2.5%	.0%
Fujitsu	13.3	8.4	3.6	225	10.9%	10.8%	18.4%	16.0%
Teradyne	6.3	.9	3.9	4	5.2%	1.1%	20.1%	.3%
Cadence	4.8	.0	3.5	0	3.9%	.0%	17.7%	.0%
Intergraph	3.6	1.7	.6	48	2.9%	2.2%	2.9%	3.4%
LSI Logic	1.6	.2	1.2	3	1.3%	.2%	5.9%	.2%
EEsof	.8	.0	.7	0	.7%	.0%	3.7%	.0%
Meta-Software	.8	.0	.7	0	.7%	.0%	3.6%	.0%
Genrad	.8	.2	.5	2	.6%	.2%	2.6%	.2%
Compact Software	.7	.0	.7	0	.6%	.0%	3.6%	.0%
Test Systems Strategies	.6	.0	.6	0	.5%	.0%	3.1%	.0%
Aucotec	.6	.1	.4	2	.5%	.1%	1.8%	.2%
Analogy	.5	.0	.5	0	.4%	.0%	2.5%	.0%
Electrical Eng. Software	.4	.0	.4	0	.3%	.0%	1.8%	.0%
COMPASS Design Automation-VLSI	.4	.3	.5	1	.3%	.4%	2.5%	.0%
Harris EDA	.4	.1	.3	3	.3%	.1%	1.4%	.2%
debis Systemhaus	.3	.1	.2	2	.3%	.1%	1.0%	.1%
Logic Automation	.3	.0	.3	0	.2%	.0%	1.4%	.0%
Data I/O	.3	.0	.3	0	.2%	.0%	1.3%	.0%
ISDATA	.2	.0	.1	0	.1%	.0%	.7%	.0%
Microsim	.1	.0	.1	0	.1%	.0%	.4%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.1%	.0%	.5%	.0%
SIMUCAD	.1	.0	.1	0	.1%	.0%	.4%	.0%

(Continued)

Table 31 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	28.4	27.0	.0	1,117	23.2%	34.7%	.0%	79.4%
All Companies	122.5	77.9	19.5	1,406	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	108.1	69.4	15.2	1,178	88.3%	89.0%	78.0%	83.7%
All Asian-Based Companies	13.3	8.4	3.6	225	10.9%	10.8%	18.4%	16.0%
All European-Based Companies	1.1	.2	.7	4	.9%	.2%	3.6%	.3%
All Hardware Companies	85.0	66.0	.0	1,117	69.4%	84.7%	.0%	79.4%
All Turnkey & SW Companies	37.5	11.9	19.5	290	30.6%	15.3%	100.0%	20.6%

Source: Dataquest (September 1992)

Table 32
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	32.3	26.3	.0	1,216	27.7%	32.0%	.0%	49.7%
Zycad	30.0	15.6	8.1	230	25.8%	19.0%	72.5%	9.4%
Digital	26.5	18.3	.0	216	22.8%	22.3%	.0%	8.8%
Ikos Systems	13.1	13.1	.0	61	11.2%	15.9%	.0%	2.5%
Intergraph	3.6	1.7	.9	52	3.1%	2.1%	7.7%	2.1%
Hewlett-Packard	3.6	2.9	.0	272	3.1%	3.5%	.0%	11.1%
Solbourne	3.1	3.0	.0	154	2.6%	3.6%	.0%	6.3%
Cadence	2.9	.0	2.1	0	2.5%	.0%	18.7%	.0%
IBM	1.0	.9	.0	227	.8%	1.1%	.0%	9.3%
Racal-Redac	.3	.3	.0	17	.3%	.4%	.0%	.7%
SIMUCAD	.1	.0	.1	0	.1%	.0%	.7%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.4%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	116.4	82.2	11.2	2,445	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	116.0	81.8	11.2	2,428	99.7%	99.6%	100.0%	99.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.3	.3	.0	17	.3%	.4%	.0%	.7%
All Hardware Companies	79.4	64.5	.0	2,146	68.2%	78.5%	.0%	87.8%
All Turnkey & SW Companies	37.0	17.7	11.2	298	31.8%	21.5%	100.0%	12.2%

Source: Dataquest (September 1992)

Table 33
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped	Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue			
Compaq	76.9	76.9	.0	14,995	19.1%	36.1%	.0%	32.1%		
IBM	46.8	44.5	.0	11,122	11.6%	20.9%	.0%	23.8%		
Wacom	34.2	6.7	23.7	578	8.5%	3.2%	14.7%	1.2%		
Hewlett-Packard	27.8	22.2	.0	5,393	6.9%	10.4%	.0%	11.6%		
Viewlogic Systems	22.1	.0	17.3	0	5.5%	.0%	10.7%	.0%		
Autodesk	17.4	.0	17.4	0	4.3%	.0%	10.8%	.0%		
Xilinx	16.2	.0	14.6	0	4.0%	.0%	9.1%	.0%		
Altera	13.7	.0	11.6	0	3.4%	.0%	7.2%	.0%		
NEC	12.0	10.1	1.0	1,690	3.0%	4.7%	.6%	3.6%		
ACTEL	10.0	.0	9.0	0	2.5%	.0%	5.6%	.0%		
Apple Computer	9.3	8.2	.0	1,940	2.3%	3.8%	.0%	4.2%		
Aucotec	7.9	1.3	5.1	328	2.0%	.6%	3.2%	.7%		
EEsof	7.8	.0	7.0	0	1.9%	.0%	4.3%	.0%		
Microsim	7.6	.0	7.1	0	1.9%	.0%	4.4%	.0%		
Orcad	7.4	.0	7.4	0	1.8%	.0%	4.6%	.0%		
Data I/O	7.0	.0	7.0	0	1.7%	.0%	4.3%	.0%		
Kloeckner-Moeller	5.4	1.1	3.8	44	1.3%	.5%	2.4%	.1%		
Fujitsu	5.0	3.1	1.3	165	1.2%	1.5%	.8%	.4%		
Everex Systems	3.8	3.8	.0	1,678	.9%	1.8%	.0%	3.6%		
Ziegler Informatics	2.8	.0	2.8	0	.7%	.0%	1.7%	.0%		
ALDEC	2.5	.0	2.5	0	.6%	.0%	1.6%	.0%		
Teradyne	2.2	.0	1.7	0	.6%	.0%	1.0%	.0%		
Dell Computer	2.2	2.2	.0	553	.5%	1.0%	.0%	1.2%		
Racal-Redac	2.1	.0	2.1	0	.5%	.0%	1.3%	.0%		

(Continued)

(Continued)

Table 33 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Harris EDA	1.9	.1	1.2	2	.5%	.0%	.7%	.0%
ALS Design	1.8	.0	1.8	0	.4%	.0%	1.1%	.0%
Research Machines	1.7	1.7	.0	266	.4%	.8%	.0%	.6%
Caditron	1.6	.8	.6	25	.4%	.4%	.4%	.1%
ISDATA	1.4	.0	1.2	0	.3%	.0%	.8%	.0%
Aucos elektronische Geräte	1.2	.4	.8	116	.3%	.2%	.5%	.2%
Spectrum Software	1.1	.0	1.1	0	.3%	.0%	.7%	.0%
Serbi	1.1	.0	1.1	0	.3%	.0%	.7%	.0%
Intrinsic	1.0	1.0	.0	10	.2%	.5%	.0%	.0%
Compact Software	1.0	.0	1.0	0	.2%	.0%	.6%	.0%
PADS Software	.9	.0	.7	0	.2%	.0%	.5%	.0%
DAT Standard info systemes	.8	.0	.7	0	.2%	.0%	.4%	.0%
Douglas Electronics	.8	.0	.8	0	.2%	.0%	.5%	.0%
Phase Three Logic	.7	.0	.7	0	.2%	.0%	.4%	.0%
Visionics	.7	.0	.5	3	.2%	.0%	.3%	.0%
Infinite Graphics	.7	.0	.7	0	.2%	.0%	.4%	.0%
Omatron	.7	.0	.7	0	.2%	.0%	.4%	.0%
Accel Technologies	.5	.0	.5	0	.1%	.0%	.3%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.3%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
PLUS Logic	.4	.0	.4	0	.1%	.0%	.3%	.0%
Tanner Research	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
Number One Systems	.4	.1	.3	27	.1%	.0%	.2%	.1%

(Continued)

Table 33 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
debis Systemhaus	.3	.1	.2	6	.1%	.0%	.1%	.0%
Digital	.3	.0	.2	0	.1%	.0%	.1%	.0%
American Small Business Comp.	.3	.0	.3	0	.1%	.0%	.2%	.0%
SIMUCAD	.3	.0	.3	0	.1%	.0%	.2%	.0%
Foresight Resources	.2	.0	.2	0	.1%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.1%	.0%
Genrad	.2	.0	.2	10	.1%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.2	.0	.2	5	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
NGR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	28.6	28.6	.0	7,697	7.1%	13.4%	.0%	16.5%
All Companies	403.5	213.2	161.0	46,655	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	323.3	187.4	114.4	43,402	80.1%	87.9%	71.0%	93.0%
All Asian-Based Companies	51.1	19.9	26.0	2,433	12.7%	9.3%	16.1%	5.2%
All European-Based Companies	29.0	5.9	20.6	820	7.2%	2.8%	12.8%	1.8%
All Hardware Companies	199.1	190.1	.0	43,913	49.3%	89.1%	.0%	94.1%
All Turnkey & SW Companies	204.4	23.2	161.0	2,743	50.7%	10.9%	100.0%	5.9%

Source: Dataquest (September 1992)

Table 34
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	103.6	88.9	.0	27.6%	.0%	12.7%	27.6%	.0%	20.8%
Mentor Graphics	95.1	29.9	32.8	9.3%	9.8%	11.7%	9.3%	9.8%	2.9%
Cadence	66.3	.0	45.1	.0%	13.4%	8.1%	.0%	13.4%	.0%
Digital	51.6	33.7	2.2	10.4%	.6%	6.3%	10.4%	.6%	1.5%
Valid	45.9	2.3	32.1	.7%	9.6%	5.6%	.7%	9.6%	1.0%
Hewlett-Packard	37.9	31.2	.0	9.7%	.0%	4.7%	9.7%	.0%	15.2%
Intergraph	36.7	11.1	12.1	3.4%	3.6%	4.5%	3.4%	3.6%	1.1%
Compaq	35.4	35.4	.0	11.0%	.0%	4.3%	11.0%	.0%	21.5%
Viewlogic Systems	27.5	.0	21.4	.0%	6.4%	3.4%	.0%	6.4%	.0%
Synopsys	24.1	.0	18.0	.0%	5.4%	3.0%	.0%	5.4%	.0%
Zycad	19.5	10.1	5.3	3.1%	1.6%	2.4%	3.1%	1.6%	.5%
Racal-Redac	16.0	.2	13.3	.0%	4.0%	2.0%	.0%	4.0%	.0%
IBM	12.4	11.8	.0	3.7%	.0%	1.5%	3.7%	.0%	9.2%
Xilinx	11.7	.0	10.5	.0%	3.1%	1.4%	.0%	3.1%	.0%
COMPASS Design Automation-VLSI	10.6	.6	8.4	.2%	2.5%	1.3%	.2%	2.5%	.0%
Teradyne	9.9	1.2	6.4	.4%	1.9%	1.2%	.4%	1.9%	.1%
LSI Logic	9.3	.9	7.0	.3%	2.1%	1.1%	.3%	2.1%	.1%
Logic Automation	9.2	.0	9.2	.0%	2.7%	1.1%	.0%	2.7%	.0%
Quickturn Systems	9.1	9.1	.0	2.8%	.0%	1.1%	2.8%	.0%	.2%
EEsof	8.4	.1	7.4	.0%	2.2%	1.0%	.0%	2.2%	.0%
Altera	7.9	.0	6.7	.0%	2.0%	1.0%	.0%	2.0%	.0%
Ikos Systems	7.8	7.8	.0	2.4%	.0%	1.0%	2.4%	.0%	.1%
ACTEL	7.8	.0	7.0	.0%	2.1%	1.0%	.0%	2.1%	.0%
Ascent Logic Corp.	7.5	.0	6.0	.0%	1.8%	.9%	.0%	1.8%	.0%

(Continued)

Table 34 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Harris EDA	7.3	1.0	4.0	.3%	1.2%	.1%
Autodesk	7.2	.0	7.2	.0%	2.1%	.0%
Comdisco Systems	6.3	.0	5.6	.0%	1.7%	.0%
Microsim	5.8	.0	5.4	.0%	1.6%	.0%
Apple Computer	5.7	5.1	.0	1.6%	.0%	3.8%
Meta-Software	5.1	.0	4.5	.0%	1.3%	.0%
Analogy	4.7	.0	4.3	.0%	1.3%	.0%
Quad Design Technology	4.3	.0	4.0	.0%	1.2%	.0%
i-Logix	4.1	.0	4.1	.0%	1.2%	.0%
Vantage Analysis Systems	3.9	.0	3.3	.0%	1.0%	.0%
Data I/O	3.7	.0	3.7	.0%	1.1%	.0%
Test Systems Strategies	3.7	.0	3.2	.0%	1.0%	.0%
Everex Systems	3.7	3.7	.0	1.2%	.0%	4.8%
Genrad	3.5	.7	2.3	.2%	.7%	.1%
Computervision	3.2	1.1	1.1	.4%	.3%	.1%
EPIC Design Technology	3.1	.0	2.8	.0%	.8%	.0%
Solbourne	3.0	2.9	.0	.9%	.0%	.8%
Orcad	2.6	.0	2.6	.0%	.8%	.0%
Scientific & Engineering SW	2.5	.0	2.5	.0%	.7%	.0%
Quantic Laboratories	2.3	.0	2.1	.0%	.6%	.0%
Motorola	2.1	.0	2.1	.0%	.6%	.0%
ALDEC	1.9	.0	1.9	.0%	.6%	.0%
CAD/CAM Group	1.8	.0	1.8	.0%	.5%	.0%
Contec Microelectronics	1.6	.0	1.4	.0%	.4%	.0%

(Continued)

Table 34 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
SIMUCAD	1.5	.0	1.4	0	.2%	.0%	.4%	.0%
Dell Computer	1.4	1.4	.0	360	.2%	.4%	.0%	1.1%
Ontos	1.2	.0	1.2	0	.1%	.0%	.4%	.0%
Compact Software	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Zuken	1.0	.4	.6	6	.1%	.1%	.2%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.3%	.0%	.0%
Spectrum Software	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Phase Three Logic	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Infinite Graphics	.8	.0	.8	0	.1%	.0%	.2%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.2%	.0%
Cascade Design Automation	.7	.0	.5	0	.1%	.0%	.2%	.0%
Visionics	.7	.0	.5	3	.1%	.0%	.1%	.0%
Electrical Eng. Software	.6	.0	.5	0	.1%	.0%	.2%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.1%	.0%
PLUS Logic	.4	.0	.4	0	.1%	.0%	.1%	.0%
PADS Software	.4	.0	.4	0	.1%	.0%	.1%	.0%
CAD Language Systems	.4	.0	.4	0	.1%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.1%	.0%	.1%	.0%
National Semiconductor	.4	.1	.4	4	.1%	.0%	.1%	.0%
Omatron	.4	.0	.4	0	.1%	.0%	.1%	.0%
Accel Technologies	.4	.0	.3	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
Tanner Research	.3	.0	.3	0	.0%	.0%	.1%	.0%

(Continued)

Table 34 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.2	.0	.2	0	.0%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Number One Systems	.0	.0	.0	1	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	31.4	30.6	.0	4,756	3.9%	9.5%	.0%	14.9%
All Companies	814.6	322.3	336.1	32,021	100.0%	100.0%	100.0%	100.0%
 All N.A.-Based Companies	 797.5	 321.7	 322.1	 32,006	 97.9%	 99.8%	 95.9%	 100.0%
All Asian-Based Companies	1.0	.4	.6	6	.1%	.1%	.2%	.0%
All European-Based Companies	16.0	.2	13.3	10	2.0%	.0%	4.0%	.0%
All Hardware Companies	300.2	261.6	.0	30,076	36.9%	81.2%	.0%	93.9%
All Turnkey & SW Companies	514.4	60.7	336.1	1,945	63.1%	18.8%	100.0%	6.1%

Source: Dataquest (September 1992)

Table 35
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	95.1	29.9	32.8	914	17.7%	18.5%	12.9%	8.3%
Sun Microsystems	88.0	76.2	.0	5,906	16.4%	47.0%	.0%	53.9%
Cadence	61.0	.0	41.5	0	11.4%	.0%	16.4%	.0%
Valid	45.9	2.3	32.1	311	8.6%	1.4%	12.7%	2.8%
Intergraph	32.5	9.0	11.3	308	6.1%	5.6%	4.4%	2.8%
Hewlett-Packard	28.1	23.4	.0	2,681	5.2%	14.4%	.0%	24.5%
Synopsys	24.1	.0	18.0	0	4.5%	.0%	7.1%	.0%
Racal-Redac	14.9	.0	12.4	0	2.8%	.0%	4.9%	.0%
Viewlogic Systems	12.6	.0	9.9	0	2.4%	.0%	3.9%	.0%
Digital	11.0	6.2	1.6	378	2.1%	3.8%	.6%	3.4%
COMPASS Design Automation-VLSI	10.4	.4	8.1	14	1.9%	.3%	3.2%	.1%
Quickturn Systems	9.1	9.1	.0	73	1.7%	5.6%	.0%	.7%
Logic Automation	9.0	.0	9.0	0	1.7%	.0%	3.6%	.0%
LSI Logic	8.4	.8	6.3	21	1.6%	.5%	2.5%	.2%
Ascent Logic Corp	7.5	.0	6.0	0	1.4%	.0%	2.4%	.0%
Comdisco Systems	6.3	.0	5.6	0	1.2%	.0%	2.2%	.0%
Harris EDA	5.8	.8	3.1	27	1.1%	.5%	1.2%	.3%
EEsof	4.9	.1	4.2	6	.9%	.0%	1.7%	.1%
Teradyne	4.5	.7	2.9	16	.8%	.4%	1.1%	.2%
Analogy	4.5	.0	4.1	0	.8%	.0%	1.6%	.0%
Meta-Software	4.5	.0	3.9	0	.8%	.0%	1.5%	.0%
Quad Design Technology	4.3	.0	4.0	0	.8%	.0%	1.6%	.0%
I-Logix	4.1	.0	4.1	0	.8%	.0%	1.6%	.0%
Vantage Analysis Systems	3.9	.0	3.3	0	.7%	.0%	1.3%	.0%

(Continued)

Table 35 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Test Systems Strategies	3.4	.0	2.9	0	.6%	.0%	1.1%	.0%
Computervision	3.2	1.1	1.1	36	.6%	.7%	.4%	.3%
EPIC Design Technology	3.1	.0	2.8	0	.6%	.0%	1.1%	.0%
Genrad	3.0	.6	2.0	29	.6%	.4%	.8%	.3%
Scientific & Engineering SW	2.5	.0	2.5	0	.5%	.0%	1.0%	.0%
Quantic Laboratories	2.3	.0	2.1	0	.4%	.0%	.8%	.0%
Motorola	2.1	.0	2.1	0	.4%	.0%	.8%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.3%	.0%	.7%	.0%
Contec Microelectronics	1.6	.0	1.4	0	.3%	.0%	.6%	.0%
ACTEL	1.6	.0	1.4	0	.3%	.0%	.6%	.0%
Ontos	1.2	.0	1.2	0	.2%	.0%	.5%	.0%
Xilinx	1.2	.0	1.1	0	.2%	.0%	.4%	.0%
SIMUCAD	1.1	.0	1.1	0	.2%	.0%	.4%	.0%
Zuken	1.0	.4	.6	6	.2%	.2%	.2%	.1%
Solbourne	.8	.8	.0	161	.2%	.5%	.0%	1.5%
Autodesk	.8	.0	.8	0	.1%	.0%	.3%	.0%
Cascade Design Automation	.7	.0	.5	0	.1%	.0%	.2%	.0%
Data I/O	.6	.0	.6	0	.1%	.0%	.3%	.0%
Microsim	.6	.0	.5	0	.1%	.0%	.2%	.0%
Compact Software	.5	.0	.5	0	.1%	.0%	.2%	.0%
CAD Language Systems	.4	.0	.4	0	.1%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.1%	.0%	.1%	.0%
Electrical Eng. Software	.4	.0	.4	0	.1%	.0%	.1%	.0%
Everex Systems	.4	.4	.0	69	.1%	.2%	.0%	.6%

(Continued)

Table 35 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
National Semiconductor	.4	.1	.3	4	.1%	.0%	.1%	.0%
Phase Three Logic	.3	.0	.2	0	.1%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.2	.0	.2	0	.0%	.0%	.1%	.0%
Infinite Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	536.5	162.2	253.4	10,963	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	520.6	161.8	240.5	10,957	97.0%	99.8%	94.9%	99.9%
All Asian-Based Companies	1.0	.4	.6	6	.2%	.2%	.2%	.1%
All European-Based Companies	14.9	.0	12.4	0	2.8%	.0%	4.9%	.0%
All Hardware Companies	135.4	116.1	.0	9,268	25.2%	71.5%	.0%	84.5%
All Turnkey & SW Companies	401.1	46.2	253.4	1,694	74.8%	28.5%	100.0%	15.5%

Source: Dataquest (September 1992)

Table 36
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	27.7	18.7	.4	0	48.6%	52.6%	4.3%	.0%
Teradyne	4.0	.6	2.4	2	6.9%	1.5%	26.6%	.4%
Cadence	3.3	.0	2.3	0	5.8%	.0%	24.6%	.0%
Intergraph	2.1	1.0	.3	27	3.7%	2.9%	3.6%	4.2%
LSI Logic	.9	.1	.7	2	1.6%	.3%	7.6%	.3%
Meta-Software	.6	.0	.5	0	1.1%	.0%	5.8%	.0%
Harris EDA	.4	.1	.3	3	.6%	.2%	3.1%	.4%
Test Systems Strategies	.4	.0	.4	0	.6%	.0%	3.9%	.0%
Genrad	.3	.1	.2	1	.6%	.2%	2.5%	.2%
EEsof	.3	.0	.3	0	.6%	.0%	3.3%	.0%
Compact Software	.3	.0	.3	0	.5%	.0%	3.1%	.0%
Analogy	.2	.0	.2	0	.4%	.0%	2.4%	.0%
COMPASS Design Automation-VLSI	.2	.2	.3	0	.4%	.5%	3.1%	.1%
Electrical Eng. Software	.2	.0	.2	0	.3%	.0%	1.7%	.0%
Logic Automation	.2	.0	.2	0	.3%	.0%	2.0%	.0%
Data I/O	.1	.0	.1	0	.2%	.0%	1.2%	.0%
SIMUCAD	.1	.0	.1	0	.1%	.0%	.8%	.0%
Microsim	.1	.0	.1	0	.1%	.0%	.5%	.0%

(Continued)

Table 36 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	15.7	14.9	.0	615	27.5%	41.7%	.0%	94.5%
All Companies	57.0	35.6	9.2	651	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	57.0	35.6	9.2	651	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	42.8	33.6	.0	615	75.1%	94.3%	.0%	94.5%
All Turnkey & SW Companies	14.2	2.0	9.2	36	24.9%	5.7%	100.0%	5.5%

Source: Dataquest (September 1992)

Table 37
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zycad	19.5	10.1	5.3	150	30.5%	22.9%	73.0%	11.1%
Sun Microsystems	15.5	12.7	.0	748	24.3%	28.7%	.0%	55.3%
Digital	12.7	8.8	.0	103	20.0%	19.9%	.0%	7.6%
Ikos Systems	7.8	7.8	.0	37	12.3%	17.7%	.0%	2.7%
Solbourne	2.1	2.1	.0	104	3.4%	4.8%	.0%	7.7%
Intergraph	2.1	1.0	.5	30	3.3%	2.3%	7.1%	2.2%
Cadence	2.0	.0	1.4	0	3.1%	.0%	19.0%	.0%
Hewlett-Packard	1.5	1.2	.0	114	2.3%	2.8%	.0%	8.5%
IBM	.3	.2	.0	59	.4%	.5%	.0%	4.4%
Racal-Redac	.2	.2	.0	8	.3%	.4%	.0%	.6%
SIMUCAD	.1	.0	.1	0	.1%	.0%	1.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	63.8	44.2	7.2	1,352	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	63.7	44.0	7.2	1,344	99.7%	99.6%	100.0%	99.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.2	.0	8	.3%	.4%	.0%	.6%
All Hardware Companies	40.0	32.9	.0	1,165	62.6%	74.4%	.0%	86.1%
All Turnkey & SW Companies	23.9	11.3	7.2	188	37.4%	25.6%	100.0%	13.9%

Source: Dataquest (September 1992)

Table 38
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	35.4	35.4	.0	6,898	22.5%	44.1%	.0%	36.2%
Viewlogic Systems	14.8	.0	11.6	0	9.4%	.0%	17.5%	.0%
IBM	12.2	11.6	.0	2,892	7.7%	14.4%	.0%	15.2%
Xilinx	10.5	.0	9.5	0	6.7%	.0%	14.3%	.0%
Hewlett-Packard	8.3	6.7	.0	2,076	5.3%	8.3%	.0%	10.9%
Altera	7.9	.0	6.7	0	5.0%	.0%	10.2%	.0%
Autodesk	6.4	.0	6.4	0	4.1%	.0%	9.7%	.0%
ACTEL	6.2	.0	5.6	0	3.9%	.0%	8.4%	.0%
Apple Computer	5.7	5.1	.0	1,203	3.6%	6.3%	.0%	6.3%
Microsim	5.1	.0	4.8	0	3.3%	.0%	7.3%	.0%
Everex Systems	3.3	3.3	.0	1,460	2.1%	4.1%	.0%	7.7%
EEsof	3.2	.0	2.9	0	2.0%	.0%	4.3%	.0%
Data I/O	3.0	.0	3.0	0	1.9%	.0%	4.5%	.0%
Orcad	2.6	.0	2.6	0	1.7%	.0%	3.9%	.0%
ALDEC	1.9	.0	1.9	0	1.2%	.0%	2.8%	.0%
Dell Computer	1.4	1.4	.0	360	.9%	1.7%	.0%	1.9%
Teradyne	1.4	.0	1.0	0	.9%	.0%	1.6%	.0%
Harris EDA	1.1	.2	.6	9	.7%	.2%	1.0%	.0%
Spectrum Software	1.0	.0	1.0	0	.6%	.0%	1.5%	.0%
Intrinsix	1.0	1.0	.0	10	.6%	1.2%	.0%	.1%
Racal-Redac	1.0	.0	1.0	0	.6%	.0%	1.4%	.0%
Douglas Electronics	.8	.0	.8	0	.5%	.0%	1.1%	.0%
Phase Three Logic	.7	.0	.7	0	.5%	.0%	1.0%	.0%
Infinite Graphics	.7	.0	.7	0	.4%	.0%	1.0%	.0%

(Continued)

Table 38 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Visionics	.7	.0	.5	3	.4%	.0%	.7%	.0%
Capilano Computing	.5	.0	.5	0	.3%	.0%	.7%	.0%
PLUS Logic	.4	.0	.4	0	.3%	.0%	.7%	.0%
PADS Software	.4	.0	.4	0	.3%	.0%	.6%	.0%
Omaton	.4	.0	.4	0	.3%	.0%	.6%	.0%
Compact Software	.4	.0	.4	0	.3%	.0%	.6%	.0%
Accel Technologies	.4	.0	.3	0	.2%	.0%	.5%	.0%
The CAD Group	.4	.0	.4	0	.2%	.0%	.5%	.0%
BV Engineering	.4	.0	.4	0	.2%	.0%	.5%	.0%
Tanner Research	.3	.0	.3	0	.2%	.0%	.5%	.0%
American Small Business Comp.	.3	.0	.3	0	.2%	.0%	.4%	.0%
Digital	.2	.0	.2	0	.1%	.0%	.3%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.3%	.0%
SIMUCAD	.2	.0	.2	0	.1%	.0%	.3%	.0%
Simutest	.2	.0	.2	0	.1%	.0%	.3%	.0%
Cascade Graphics	.2	.0	.2	0	.1%	.0%	.2%	.0%
Vamp	.2	.0	.2	0	.1%	.0%	.2%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	4	.1%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.2%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.1%	.0%
Number One Systems	.0	.0	.0	1	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 38 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	15.7	15.7	.0	4,141	10.0%	19.6%	.0%	21.7%
All Companies	157.3	80.3	66.3	19,056	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	156.4	80.3	65.3	19,054	99.4%	100.0%	98.5%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.0	.0	1.0	2	.6%	.0%	1.5%	.0%
All Hardware Companies	82.0	79.1	.0	19,028	52.1%	98.5%	.0%	99.9%
All Turnkey & SW Companies	75.3	1.2	66.3	27	47.9%	1.5%	100.0%	.1%

Source: Dataquest (September 1992)

Table 39 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Market Share									
	Total		Hardware		Software		Hardware		Software	
	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units	Revenue	Units
LSI Logic	3.9	4	2.9	10	2.9	10	2.9	10	2.9	10
Altera	3.7	0	3.1	0	3.1	0	3.1	0	3.1	0
Logic Automation	3.5	0	3.5	0	3.5	0	3.5	0	3.5	0
Genrad	3.5	7	2.3	35	2.3	35	2.3	35	2.3	35
Orcad	3.5	0	3.5	0	3.5	0	3.5	0	3.5	0
Harris EDA	3.3	1	2.0	6	2.0	6	2.0	6	2.0	6
Xilinx	3.2	0	2.9	0	2.9	0	2.9	0	2.9	0
debis Systemhaus	2.8	7	1.7	19	1.7	19	1.7	19	1.7	19
Ziegler Informatics	2.8	0	2.8	0	2.8	0	2.8	0	2.8	0
Ikos Systems	2.6	2.6	0	12	0	12	0	12	0	12
ACTEL	2.5	0	2.3	0	2.3	0	2.3	0	2.3	0
Apple Computer	2.4	2.1	0	504	0	504	0	504	0	504
Vantage Analysis Systems	2.1	0	1.8	0	1.8	0	1.8	0	1.8	0
Data I/O	2.0	0	2.0	0	2.0	0	2.0	0	2.0	0
ALS Design	2.0	0	2.0	0	2.0	0	2.0	0	2.0	0
ISDATA	2.0	0	1.8	0	1.8	0	1.8	0	1.8	0
Comdisco Systems	1.8	0	1.6	0	1.6	0	1.6	0	1.6	0
Microsim	1.7	0	1.6	0	1.6	0	1.6	0	1.6	0
Research Machines	1.7	1.7	0	266	0	266	0	266	0	266
Caditron	1.6	8	0.6	25	0.6	25	0.6	25	0.6	25
Quickturn Systems	1.4	1.4	0	11	0	11	0	11	0	11
Test Systems Strategies	1.2	0	1.1	0	1.1	0	1.1	0	1.1	0
Aucos elektronische Gerate	1.2	4	0.8	116	0.8	116	0.8	116	0.8	116
Serbi	1.1	0	1.1	0	1.1	0	1.1	0	1.1	0

(Continued)

Table 39 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share			
					Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Solbourne	1.0	.9	.0	86	.2%	.4%	.0%	.3%
ISKA	.9	.4	.4	16	.2%	.2%	.2%	.1%
i-Logix	.8	.0	.8	0	.2%	.0%	.4%	.0%
DAT Standard info systems	.8	.0	.7	0	.1%	.0%	.4%	.0%
Dell Computer	.8	.8	.0	194	.1%	.3%	.0%	.7%
Compact Software	.7	.0	.7	0	.1%	.0%	.4%	.0%
Inca	.7	.7	.0	3	.1%	.3%	.0%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.1%	.0%	.4%	.0%
Technische Computer Systeme	.6	.1	.5	16	.1%	.0%	.3%	.1%
ALDEC	.5	.0	.5	0	.1%	.0%	.3%	.0%
Everex Systems	.4	.4	.0	176	.1%	.2%	.0%	.7%
National Semiconductor	.4	.1	.3	4	.1%	.0%	.2%	.0%
Number One Systems	.3	.1	.2	24	.1%	.0%	.1%	.1%
Motorola	.3	.0	.3	0	.1%	.0%	.2%	.0%
PADS Software	.3	.0	.2	0	.0%	.0%	.1%	.0%
Omaton	.2	.0	.2	0	.0%	.0%	.1%	.0%
Zuken	.2	.1	.1	1	.0%	.0%	.1%	.0%
CAD Language Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Electrical Eng. Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.1%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.1%	.0%
Cascade Design Automation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.1%	.0%

(Continued)

Table 39 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Accel Technologies	.1	.0	.1	0	.0%	.0%	.0%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.0%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	17.0	16.6	.0	2,716	3.2%	6.6%	.0%	10.1%
All Companies	535.2	250.9	185.7	26,879	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	451.8	229.8	133.6	25,639	84.4%	91.6%	71.9%	95.4%
All Asian-Based Companies	.2	.1	.1	1	.0%	.0%	.1%	.0%
All European-Based Companies	83.2	21.0	52.0	1,239	15.5%	8.4%	28.0%	4.6%
All Hardware Companies	235.6	204.0	.0	25,156	44.0%	81.3%	.0%	93.6%
All Turnkey & SW Companies	299.6	46.9	185.7	1,724	56.0%	18.7%	100.0%	6.4%

Source: Dataquest (September 1992)

Table 40
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share						Hardware	
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware		Total Factory Revenue	Hardware Revenue	Software Revenue	Units Shipped	Revenue	Units Shipped
				Revenue	Units Shipped						
Mentor Graphics	57.4	14.4	23.6		552	17.7%	12.0%	18.1%		7.3%	
Sun Microsystems	47.0	40.7	.0		2,557	14.5%	34.0%	.0%		33.8%	
Hewlett-Packard	37.9	31.5	.0		3,253	11.7%	26.3%	.0%		43.0%	
Intergraph	28.9	6.9	10.7		241	8.9%	5.8%	8.2%		3.2%	
Valid	21.6	.7	13.7		42	6.7%	.6%	10.6%		.6%	
Siemens Nixdorf Info systems	21.0	10.5	7.4		309	6.5%	8.8%	5.7%		4.1%	
Racal-Redac	16.9	.0	14.1		0	5.2%	.0%	10.8%		.0%	
Cadence	13.0	.0	8.9		0	4.0%	.0%	6.8%		.0%	
Synopsys	8.0	.0	6.0		0	2.5%	.0%	4.6%		.0%	
Digital	7.4	5.2	.0		322	2.3%	4.3%	.0%		4.3%	
Computervision	5.5	2.3	1.3		41	1.7%	1.9%	1.0%		.5%	
COMPASS Design Automation-VLSI	5.4	.2	4.2		7	1.7%	.2%	3.2%		.1%	
AnaCAD	4.5	.0	4.5		0	1.4%	.0%	3.5%		.0%	
HP Cade	4.2	2.5	1.3		42	1.3%	2.1%	1.0%		.6%	
EEsof	4.2	.0	3.6		5	1.3%	.0%	2.8%		.1%	
Analogy	4.0	.0	3.6		0	1.2%	.0%	2.8%		.0%	
LSI Logic	3.5	.4	2.6		9	1.1%	.3%	2.0%		.1%	
Logic Automation	3.5	.0	3.5		0	1.1%	.0%	2.7%		.0%	
Genrad	3.0	.6	2.0		29	.9%	.5%	1.5%		.4%	
Aucotec	2.8	.5	1.8		20	.9%	.4%	1.4%		.3%	
Viewlogic Systems	2.5	.0	1.9		0	.8%	.0%	1.5%		.0%	
Harris EDA	2.4	.2	1.4		13	.8%	.2%	1.1%		.2%	
debis Systemhaus	2.1	.5	1.3		11	.7%	.4%	1.0%		.1%	
Vantage Analysis Systems	2.1	.0	1.8		0	.6%	.0%	1.4%		.0%	
(Continued)											

(Continued)

Table 40 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Teradyne	2.0	.3	1.3	7	.6%	.3%	1.0%	.1%
Comdisco Systems	1.8	.0	1.6	0	.5%	.0%	1.2%	.0%
Quickturn Systems	1.4	1.4	.0	11	.4%	1.2%	.0%	.1%
Test Systems Strategies	1.1	.0	1.0	0	.3%	.0%	.7%	.0%
Autodesk	1.1	.0	1.1	0	.3%	.0%	.9%	.0%
ISKA	.9	.4	.4	16	.3%	.3%	.3%	.2%
I-Logix	.8	.0	.8	0	.3%	.0%	.6%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.2%	.0%	.5%	.0%
ACTEL	.5	.0	.5	0	.2%	.0%	.3%	.0%
ISDATA	.4	.0	.4	0	.1%	.0%	.3%	.0%
Technische Computer Systeme	.4	.1	.3	11	.1%	.1%	.3%	.1%
National Semiconductor	.4	.1	.3	4	.1%	.1%	.2%	.1%
Data I/O	.3	.0	.3	0	.1%	.0%	.3%	.0%
Xilinx	.3	.0	.3	0	.1%	.0%	.2%	.0%
Motorola	.3	.0	.3	0	.1%	.0%	.2%	.0%
Compact Software	.3	.0	.3	0	.1%	.0%	.2%	.0%
Solbourne	.3	.3	.0	52	.1%	.2%	.0%	.7%
Inca	.2	.2	.0	1	.1%	.2%	.0%	.0%
CAD Language Systems	.2	.0	.2	0	.1%	.0%	.1%	.0%
ALS Design	.2	.0	.2	0	.1%	.0%	.2%	.0%
Zuken	.2	.1	.1	1	.1%	.1%	.1%	.0%
DAPCO	.2	.0	.1	0	.1%	.0%	.1%	.0%
Microsim	.2	.0	.2	0	.1%	.0%	.1%	.0%
Electrical Eng. Software	.1	.0	.1	0	.0%	.0%	.1%	.0%

(Continued)

Table 40 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cascade Design Automation	.1	.0	.1	0	.0%	.0%	.1%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	8	.0%	.0%	.0%	.1%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	323.7	119.8	129.8	7,565	100.0%	100.0%	100.0%	100.0%
 All N.A.-Based Companies	 269.6	 105.0	 98.0	 7,154	 83.3%	 87.7%	 75.5%	 94.6%
All Asian-Based Companies	.2	.1	.1	1	.1%	.1%	.1%	.0%
All European-Based Companies	54.0	14.7	31.7	409	16.7%	12.3%	24.4%	5.4%
All Hardware Companies	94.2	79.3	.0	6,205	29.1%	66.2%	.0%	82.0%
All Turnkey & SW Companies	229.5	40.5	129.8	1,360	70.9%	33.8%	100.0%	18.0%

Source: Dataquest (September 1992)

Table 41
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	22.6	15.6	.0	0	59.7%	62.4%	.0%	.0%
Teradyne	1.8	.2	1.1	1	4.6%	1.0%	26.1%	.3%
Intergraph	1.2	.6	.2	17	3.2%	2.3%	4.6%	4.6%
Cadence	.7	.0	.5	0	1.9%	.0%	11.6%	.0%
Aucotec	.6	.1	.4	2	1.5%	.3%	8.7%	.6%
LSI Logic	.4	.0	.3	1	1.0%	.2%	7.0%	.2%
Genrad	.3	.1	.2	1	.9%	.3%	5.6%	.3%
debis Systemhaus	.3	.1	.2	2	.9%	.4%	4.8%	.4%
EEsof	.3	.0	.3	0	.8%	.0%	6.3%	.0%
Analogy	.2	.0	.2	0	.6%	.0%	4.6%	.0%
Compact Software	.2	.0	.2	0	.5%	.0%	4.3%	.0%
ISDATA	.2	.0	.1	0	.4%	.0%	3.4%	.0%
Test Systems Strategies	.1	.0	.1	0	.3%	.0%	2.9%	.0%
COMPASS Design Automation-VLSI	.1	.1	.1	0	.3%	.4%	2.9%	.1%
MacNeal-Schwendler	.1	.0	.1	0	.2%	.0%	2.2%	.0%
Logic Automation	.1	.0	.1	0	.2%	.0%	1.7%	.0%
Electrical Eng. Software	.1	.0	.1	0	.2%	.0%	1.2%	.0%
Data I/O	.1	.0	.1	0	.2%	.0%	1.4%	.0%
Microsim	.0	.0	.0	0	.1%	.0%	.5%	.0%
Meta-Software	.0	.0	.0	0	.1%	.0%	.2%	.0%

(Continued)

Table 41 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	8.6	8.2	.0	338	22.7%	32.8%	.0%	93.5%
All Companies	37.9	25.0	4.1	362	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	36.9	24.8	3.4	358	97.2%	99.3%	83.1%	98.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	1.1	.2	.7	4	2.8%	.7%	16.9%	1.1%
All Hardware Companies	31.2	23.8	.0	338	82.4%	95.2%	.0%	93.5%
All Turnkey & SW Companies	6.7	1.2	4.1	24	17.6%	4.8%	100.0%	6.5%

Source: Dataquest (September 1992)

Table 42
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Server
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	10.6	7.3	.0	88	34.8%	33.2%	.0%	14.4%
Sun Microsystems	8.3	6.8	.0	199	27.2%	30.6%	.0%	32.7%
Zycad	4.5	2.3	1.2	34	14.8%	10.6%	66.3%	5.7%
Ikos Systems	2.6	2.6	.0	12	8.6%	11.8%	.0%	2.0%
Hewlett-Packard	1.5	1.2	.0	114	4.9%	5.5%	.0%	18.8%
Intergraph	1.2	.6	.3	17	4.0%	2.7%	15.8%	2.8%
Solbourne	.7	.7	.0	34	2.2%	2.9%	.0%	5.5%
IBM	.4	.4	.0	102	1.4%	1.8%	.0%	16.8%
Cadence	.4	.0	.3	0	1.4%	.0%	15.2%	.0%
Racal-Redac	.2	.2	.0	9	.6%	.8%	.0%	1.5%
MacNeal-Schwendler	.1	.0	.1	0	.2%	.0%	2.7%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	30.5	22.1	1.8	609	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	30.3	21.9	1.8	600	99.4%	99.2%	100.0%	98.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.2	.2	.0	9	.6%	.8%	.0%	1.5%
All Hardware Companies	24.1	19.0	.0	549	79.0%	85.9%	.0%	90.1%
All Turnkey & SW Companies	6.4	3.1	1.8	60	21.0%	14.1%	100.0%	9.9%

Source: Dataquest (September 1992)

Table 43
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	35.4	35.4	.0	6,898	24.7%	42.1%	.0%	37.6%
IBM	21.1	20.0	.0	5,005	14.7%	23.8%	.0%	27.3%
Hewlett-Packard	13.9	11.1	.0	2,383	9.7%	13.2%	.0%	13.0%
Autodesk	8.9	.0	8.9	0	6.2%	.0%	17.9%	.0%
Aucotec	7.9	1.3	5.1	328	5.5%	1.6%	10.2%	1.8%
Kloeckner-Moeller	5.4	1.1	3.8	44	3.8%	1.3%	7.7%	.2%
Altera	3.7	.0	3.1	0	2.6%	.0%	6.3%	.0%
Orcad	3.5	.0	3.5	0	2.4%	.0%	6.9%	.0%
Xilinx	2.9	.0	2.6	0	2.0%	.0%	5.3%	.0%
Viewlogic Systems	2.9	.0	2.3	0	2.0%	.0%	4.5%	.0%
Ziegler Informatics	2.8	.0	2.8	0	1.9%	.0%	5.6%	.0%
EEsof	2.7	.0	2.5	0	1.9%	.0%	4.9%	.0%
Apple Computer	2.4	2.1	.0	504	1.7%	2.5%	.0%	2.8%
ACTEL	2.0	.0	1.8	0	1.4%	.0%	3.6%	.0%
ALS Design	1.8	.0	1.8	0	1.2%	.0%	3.5%	.0%
Research Machines	1.7	1.7	.0	266	1.2%	2.0%	.0%	1.5%
Caditron	1.6	.8	.6	25	1.1%	1.0%	1.3%	.1%
Data I/O	1.6	.0	1.6	0	1.1%	.0%	3.2%	.0%
Microsim	1.5	.0	1.4	0	1.1%	.0%	2.8%	.0%
ISDATA	1.4	.0	1.2	0	1.0%	.0%	2.4%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.8%	.4%	1.6%	.6%
Racal-Redac	1.1	.0	1.1	0	.8%	.0%	2.2%	.0%
Serbi	1.1	.0	1.1	0	.7%	.0%	2.1%	.0%
Harris EDA	.8	.0	.6	0	.6%	.0%	1.1%	.0%

(Continued)

Table 43 (Continued)
1991 CAD/CAM/CAE/EDA Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dell Computer	.8	.8	.0	194	.5%	.9%	.0%	1.1%
DAT Standard Info ssystemes	.8	.0	.7	0	.5%	.0%	1.4%	.0%
Teradyne	.6	.0	.5	0	.4%	.0%	.9%	.0%
ALDEC	.5	.0	.5	0	.3%	.0%	1.0%	.0%
Inca	.5	.5	.0	2	.3%	.6%	.0%	.0%
Everex Systems	.4	.4	.0	168	.3%	.5%	.0%	.9%
debis Systemhaus	.3	.1	.2	6	.2%	.1%	.4%	.0%
Number One Systems	.3	.1	.2	24	.2%	.1%	.5%	.1%
PADS Software	.3	.0	.2	0	.2%	.0%	.4%	.0%
Compact Software	.3	.0	.3	0	.2%	.0%	.5%	.0%
Omation	.2	.0	.2	0	.2%	.0%	.5%	.0%
Technische Computer Systeme	.2	.0	.1	5	.1%	.0%	.3%	.0%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	4	.1%	.0%	.1%	.0%
Accel Technologies	.1	.0	.1	0	.0%	.0%	.1%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.1%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.1%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.1%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 43 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	8.4	8.4	.0	2,377	5.9%	10.0%	.0%	13.0%
All Companies	143.1	84.0	49.9	18,343	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	115.1	78.1	30.3	17,526	80.4%	93.0%	60.7%	95.5%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	28.0	5.9	19.6	817	19.6%	7.0%	39.3%	4.5%
All Hardware Companies	86.0	81.9	.0	18,064	60.1%	97.6%	.0%	98.5%
All Turnkey & SW Companies	57.0	2.1	49.9	279	39.9%	2.4%	100.0%	1.5%

Source: Dataquest (September 1992)

Table 44

1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	54.1	46.4	.0	2,924	13.8%	26.5%	.0%	20.7%
Mentor Graphics	45.6	13.2	16.9	438	11.6%	7.5%	10.7%	3.1%
Wacom	36.6	7.3	25.5	603	9.4%	4.2%	16.2%	4.3%
NEC	34.2	22.3	9.2	2,387	8.8%	12.7%	5.8%	16.9%
Fujitsu	31.0	19.5	8.4	698	7.9%	11.1%	5.3%	4.9%
Valid	22.3	.0	18.3	0	5.7%	.0%	11.6%	.0%
Hewlett-Packard	19.2	15.8	.0	2,031	4.9%	9.0%	.0%	14.4%
Zuken	18.8	7.5	11.3	110	4.8%	4.3%	7.1%	.8%
Cadence	14.6	.0	14.6	0	3.7%	.0%	9.3%	.0%
IBM	11.5	10.9	.0	2,724	2.9%	6.2%	.0%	19.3%
Intergraph	10.6	2.3	4.1	84	2.7%	1.3%	2.6%	.6%
Digital	9.9	6.3	.5	89	2.5%	3.6%	.3%	.6%
Viewlogic Systems	8.2	.0	6.4	0	2.1%	.0%	4.0%	.0%
Synopsys	8.0	.0	6.0	0	2.0%	.0%	3.8%	.0%
Zycad	6.0	3.1	1.6	46	1.5%	1.8%	1.0%	.3%
EEsof	4.5	.0	4.0	3	1.2%	.0%	2.5%	.0%
COMPASS Design Automation-VLSI	3.9	.2	3.0	5	1.0%	.1%	1.9%	.0%
Quickturn Systems	3.5	3.5	.0	28	.9%	2.0%	.0%	.2%
Xilinx	2.7	.0	2.4	0	.7%	.0%	1.5%	.0%
Data I/O	2.6	.0	2.6	0	.7%	.0%	1.7%	.0%
Ikos Systems	2.6	2.6	.0	12	.7%	1.5%	.0%	.1%
Contec Microelectronics	2.4	.0	2.2	0	.6%	.0%	1.4%	.0%
Compaq	2.3	2.3	.0	450	.6%	1.3%	.0%	3.2%
Tokyo Electron—NO OEM	2.2	.7	1.1	8	.6%	.4%	.7%	.1%

(Continued)

Table 44 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Autodesk	2.2	.0	2.2	0	.6%	.0%	1.4%	.0%
ACTEL	1.9	.0	1.8	0	.5%	.0%	1.1%	.0%
Century Research Center	1.6	.8	.6	10	.4%	.5%	.4%	.1%
Meta-Software	1.6	.0	1.4	0	.4%	.0%	.9%	.0%
ISI Logic	1.6	.2	1.2	4	.4%	.1%	.7%	.0%
Comdisco Systems	1.5	.0	1.3	0	.4%	.0%	.8%	.0%
Logic Automation	1.4	.0	1.4	0	.4%	.0%	.9%	.0%
Teradyne	1.4	.2	.9	3	.4%	.1%	.6%	.0%
Altera	1.4	.0	1.2	0	.4%	.0%	.7%	.0%
Omron	1.4	1.2	.1	39	.3%	.7%	.1%	.3%
Test Systems Strategies	1.2	.0	1.1	0	.3%	.0%	.7%	.0%
Sony	1.2	1.1	.0	70	.3%	.6%	.0%	.5%
Analogy	1.1	.0	1.0	0	.3%	.0%	.6%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.3%	.0%	.6%	.0%
Apple Computer	1.0	.9	.0	213	.3%	.5%	.0%	1.5%
Microsim	1.0	.0	1.0	0	.3%	.0%	.6%	.0%
Compact Software	.7	.0	.7	0	.2%	.0%	.5%	.0%
Quantic Laboratories	.6	.0	.5	0	.1%	.0%	.3%	.0%
I-Logix	.6	.0	.6	0	.1%	.0%	.3%	.0%
Electrical Eng. Software	.5	.0	.5	0	.1%	.0%	.3%	.0%
EPIC Design Technology	.4	.0	.3	0	.1%	.0%	.2%	.0%
Cascade Design Automation	.4	.0	.2	0	.1%	.0%	.2%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.1%	.0%	.2%	.0%
Solbourne	.3	.3	.0	30	.1%	.2%	.0%	.2%

(Continued)

Table 44 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
SIMUCAD	.3	.0	.3	0	.1%	.0%	.2%	.0%
PADS Software	.2	.0	.1	0	.0%	.0%	.1%	.0%
ALDEC	.1	.0	.1	0	.0%	.0%	.1%	.0%
Everex Systems	.1	.1	.0	53	.0%	.1%	.0%	.4%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.1%	.0%
Motorola	.1	.0	.1	0	.0%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accel Technologies	.1	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Tanner Research	.0	.0	.0	0	.0%	.0%	.0%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.0%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	6.5	6.3	.0	1,048	1.7%	3.6%	.0%	7.4%
All Companies	391.2	175.3	158.0	14,109	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	264.2	114.8	101.9	10,184	67.5%	65.5%	64.5%	72.2%
All Asian-Based Companies	127.0	60.5	56.2	3,924	32.5%	34.5%	35.5%	27.8%
All European-Based Companies	.0	.0	.0	1	.0%	.0%	.0%	.0%
All Hardware Companies	111.5	96.6	.0	9,671	28.5%	55.1%	.0%	68.5%
All Turnkey & SW Companies	279.8	78.7	158.0	4,438	71.5%	44.9%	100.0%	31.5%

Source: Dataquest (September 1992)

Table 45
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	46.0	39.8	.0	2,670	18.1%	38.4%	.0%	46.7%
Mentor Graphics	45.6	13.2	16.9	438	17.9%	12.7%	15.5%	7.7%
Valid	22.3	.0	18.3	0	8.8%	.0%	16.9%	.0%
NEC	22.3	12.2	8.2	697	8.8%	11.8%	7.6%	12.2%
Zuken	18.8	7.5	11.3	110	7.4%	7.3%	10.4%	1.9%
Cadence	13.5	.0	13.5	0	5.3%	.0%	12.4%	.0%
Hewlett-Packard	13.5	11.2	.0	1,131	5.3%	10.8%	.0%	19.8%
Fujitsu	12.7	8.0	3.4	308	5.0%	7.7%	3.2%	5.4%
Intergraph	10.2	2.1	4.0	76	4.0%	2.0%	3.7%	1.3%
Synopsys	8.0	.0	6.0	0	3.2%	.0%	5.5%	.0%
COMPASS Design Automation-VLSI	3.8	.2	2.9	5	1.5%	.2%	2.7%	.1%
Viewlogic Systems	3.8	.0	2.9	0	1.5%	.0%	2.7%	.0%
Quickturn Systems	3.5	3.5	.0	28	1.4%	3.4%	.0%	.5%
EEsof	2.6	.0	2.3	3	1.0%	.0%	2.1%	.1%
Wacom	2.5	.6	1.9	25	1.0%	.6%	1.7%	.4%
Contec Microelectronics	2.4	.0	2.2	0	.9%	.0%	2.0%	.0%
Tokyo Electron—NO OEM	2.2	.7	1.1	8	.9%	.7%	1.0%	.1%
Digital	2.2	1.2	.4	70	.9%	1.1%	.4%	1.2%
Century Research Center	1.6	.8	.6	10	.6%	.8%	.5%	.2%
Comdisco Systems	1.5	.0	1.3	0	.6%	.0%	1.2%	.0%
LSI Logic	1.4	.1	1.1	4	.6%	.1%	1.0%	.1%
Logic Automation	1.4	.0	1.4	0	.5%	.0%	1.3%	.0%
Meta-Software	1.4	.0	1.2	0	.5%	.0%	1.1%	.0%
Omron	1.4	1.2	.1	39	.5%	1.2%	.1%	.7%

(Continued)

Table 45 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sony	1.2	1.1	.0	70	.5%	1.0%	.0%	1.2%
Test Systems Strategies	1.1	.0	1.0	0	.4%	.0%	.9%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.4%	.0%	.8%	.0%
Analogy	1.0	.0	.9	0	.4%	.0%	.8%	.0%
Teradyne	.7	.1	.4	2	.3%	.1%	.4%	.0%
Quantic Laboratories	.6	.0	.5	0	.2%	.0%	.5%	.0%
I-Logix	.6	.0	.6	0	.2%	.0%	.5%	.0%
Data I/O	.5	.0	.5	0	.2%	.0%	.4%	.0%
ACTEL	.4	.0	.4	0	.2%	.0%	.3%	.0%
Electrical Eng. Software	.4	.0	.3	0	.1%	.0%	.3%	.0%
Cascade Design Automation	.4	.0	.2	0	.1%	.0%	.2%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.1%	.0%	.3%	.0%
EPIC Design Technology	.4	.0	.3	0	.1%	.0%	.3%	.0%
Compact Software	.3	.0	.3	0	.1%	.0%	.3%	.0%
Xilinx	.3	.0	.2	0	.1%	.0%	.2%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.2%	.0%
SIMUGAD	.2	.0	.2	0	.1%	.0%	.2%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.1%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.1%	.0%
Solbourne	.1	.1	.0	18	.0%	.1%	.0%	.3%
Motorola	.1	.0	.1	0	.0%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%

(Continued)

Table 45 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	2	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	254.3	103.7	108.5	5,715	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	191.6	71.5	81.9	4,448	75.4%	69.0%	75.5%	77.8%
All Asian-Based Companies	62.6	32.2	26.6	1,267	24.6%	31.0%	24.5%	22.2%
All European-Based Companies	.0	.0	.0	1	.0%	.0%	.0%	.0%
All Hardware Companies	65.9	56.8	.0	3,989	25.9%	54.8%	.0%	69.8%
All Turnkey & SW Companies	188.4	46.9	108.5	1,726	74.1%	45.2%	100.0%	30.2%

Source: Dataquest (September 1992)

Table 46
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	13.3	8.4	3.6	225	54.9%	56.1%	60.5%	65.0%
Digital	5.2	3.5	.1	0	21.5%	23.5%	1.7%	.0%
Cadence	.7	.0	.7	0	3.0%	.0%	12.3%	.0%
Teradyne	.6	.1	.4	0	2.3%	.5%	5.9%	.1%
Intergraph	.2	.1	.0	4	.9%	.7%	.5%	1.1%
Meta-Software	.2	.0	.2	0	.8%	.0%	2.7%	.0%
Compact Software	.2	.0	.2	0	.7%	.0%	3.0%	.0%
EEsof	.2	.0	.2	0	.7%	.0%	2.7%	.0%
Electrical Eng. Software	.2	.0	.1	0	.7%	.0%	2.4%	.0%
LSI Logic	.2	.0	.1	0	.7%	.1%	2.0%	.1%
Test Systems Strategies	.1	.0	.1	0	.5%	.0%	2.0%	.0%
Data I/O	.1	.0	.1	0	.3%	.0%	1.3%	.0%
COMPASS Design Automation-VLSI	.1	.1	.1	0	.3%	.3%	1.3%	.0%
Analogy	.1	.0	.1	0	.2%	.0%	.8%	.0%
Logic Automation	.0	.0	.0	0	.1%	.0%	.5%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.2%	.0%
Microsim	.0	.0	.0	0	.0%	.0%	.2%	.0%
Other Companies	3.0	2.8	.0	116	12.2%	18.8%	.0%	33.6%
All Companies	24.3	15.0	6.0	346	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	10.9	6.6	2.4	121	45.1%	43.9%	39.5%	35.0%
All Asian-Based Companies	13.3	8.4	3.6	225	54.9%	56.1%	60.5%	65.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	8.1	6.3	.0	116	33.2%	42.3%	.0%	33.6%
All Turnkey & SW Companies	16.2	8.7	6.0	229	66.8%	57.7%	100.0%	66.4%

Source: Dataquest (September 1992)

Table 47
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	8.1	6.6	.0	254	39.2%	44.4%	.0%	58.1%
Zycad	6.0	3.1	1.6	46	29.0%	20.9%	76.4%	10.5%
Ikos Systems	2.6	2.6	.0	12	12.6%	17.5%	.0%	2.8%
Digital	2.4	1.6	.0	19	11.5%	11.0%	.0%	4.4%
Hewlett-Packard	.5	.4	.0	35	2.2%	2.5%	.0%	8.1%
Cadence	.4	.0	.4	0	2.1%	.0%	20.8%	.0%
IBM	.2	.2	.0	54	1.2%	1.5%	.0%	12.5%
Solbourne	.2	.2	.0	12	1.2%	1.6%	.0%	2.7%
Intergraph	.2	.1	.1	4	1.1%	.6%	2.4%	.9%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.5%	.0%
Wacom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	20.7	14.9	2.1	437	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	20.7	14.9	2.1	437	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	14.0	11.7	.0	387	67.8%	78.5%	.0%	88.6%
All Turnkey & SW Companies	6.7	3.2	2.1	50	32.2%	21.5%	100.0%	11.4%

Source: Dataquest (September 1992)

Table 48
1991 CAD/CAM/CAE/GIS Final Market Share

Company	Application:			Electronic CAE			Personal Computer			Asia		
	Platform:			Region:			Units:			Millions of U.S. Dollars/Actual Units		
	Revenue			Revenue			Revenue			Revenue		
Company	Total			Hardware			Market Share			Hardware		
	Factory	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Units
Wacom	34.2	6.7	23.7	578	37.1%	16.1%	57.1%	7.6%				
NEC	12.0	10.1	1.0	1,690	13.0%	24.2%	2.3%	22.2%				
IBM	11.3	10.7	.0	2,669	12.2%	25.6%	.0%	35.1%				
Hewlett-Packard	5.3	4.2	.0	865	5.7%	10.1%	.0%	11.4%				
Fujitsu	5.0	3.1	1.3	165	5.4%	7.5%	3.2%	2.2%				
Viewlogic Systems	4.4	.0	3.5	0	4.8%	.0%	8.3%	.0%				
Xilinx	2.4	.0	2.2	0	2.6%	.0%	5.3%	.0%				
Compaq	2.3	2.3	.0	450	2.5%	5.5%	.0%	5.9%				
Data I/O	2.1	.0	2.1	0	2.3%	.0%	5.0%	.0%				
Autodesk	1.9	.0	1.9	0	2.1%	.0%	4.6%	.0%				
Efsof	1.7	.0	1.5	0	1.9%	.0%	3.7%	.0%				
ACTEL	1.6	.0	1.4	0	1.7%	.0%	3.4%	.0%				
Altera	1.4	.0	1.2	0	1.5%	.0%	2.8%	.0%				
Apple Computer	1.0	.9	.0	213	1.1%	2.2%	.0%	2.8%				
Microsim	.9	.0	.9	0	1.0%	.0%	2.1%	.0%				
Compact Software	.3	.0	.3	0	.3%	.0%	.6%	.0%				
Tetradyne	.2	.0	.2	0	.2%	.0%	.4%	.0%				
PADS Software	.2	.0	.1	0	.2%	.0%	.3%	.0%				
ALDEC	.1	.0	.1	0	.1%	.0%	.3%	.0%				
Beverex Systems	.1	.1	.0	50	.1%	.3%	.0%	.7%				
Digital	.1	.0	.0	0	.1%	.0%	.1%	.0%				
Accel Technologies	.1	.0	.0	0	.1%	.0%	.1%	.0%				
The CAD Group	.0	.0	.0	0	.0%	.0%	.1%	.0%				
Tanner Research	.0	.0	.0	0	.0%	.0%	.0%	.0%				

(Continued)

Table 48 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.0%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	3.5	3.5	.0	932	3.8%	8.5%	.0%	12.2%
All Companies	92.0	41.7	41.5	7,612	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	40.9	21.8	15.5	5,179	44.5%	52.2%	37.3%	68.0%
All Asian-Based Companies	51.1	19.9	26.0	2,433	55.5%	47.8%	62.7%	32.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	23.5	21.8	.0	5,179	25.6%	52.2%	.0%	68.0%
All Turnkey & SW Companies	68.5	19.9	41.5	2,433	74.4%	47.8%	100.0%	32.0%

Source: Dataquest (September 1992)

Table 49
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	3.8	3.8	.0	750	16.8%	27.2%	.0%	36.2%
Digital	3.1	2.1	.0	30	13.4%	14.9%	.0%	1.4%
IBM	2.4	2.3	.0	567	10.4%	16.1%	.0%	27.4%
Sun Microsystems	2.1	1.8	.0	136	9.2%	12.9%	.0%	6.6%
Hewlett-Packard	1.8	1.5	.0	243	8.0%	10.7%	.0%	11.7%
Orcad	1.3	.0	1.3	0	5.7%	.0%	21.0%	.0%
LSI Logic	.8	.1	.6	2	3.4%	.6%	9.3%	.1%
Genrad	.8	.1	.5	8	3.4%	1.0%	8.3%	.4%
Altera	.7	.0	.6	0	3.0%	.0%	9.3%	.0%
Analogy	.5	.0	.5	0	2.3%	.0%	7.5%	.0%
EEsof	.4	.0	.4	0	1.8%	.0%	5.6%	.0%
COMPASS Design Automation-VLSI	.4	.0	.3	1	1.8%	.2%	5.1%	.0%
Data I/O	.4	.0	.4	0	1.5%	.0%	5.6%	.0%
Xilinx	.3	.0	.3	0	1.4%	.0%	4.6%	.0%
ACTEL	.3	.0	.3	0	1.4%	.0%	4.6%	.0%
Comdisco Systems	.3	.0	.3	0	1.3%	.0%	4.2%	.0%
Compact Software	.3	.0	.3	0	1.3%	.0%	4.6%	.0%
Intergraph	.3	.1	.1	4	1.1%	.8%	.8%	.2%
Autodesk	.2	.0	.2	0	.8%	.0%	3.0%	.0%
Teradyne	.1	.0	.1	0	.5%	.0%	1.4%	.0%
Spectrum Software	.1	.0	.1	0	.4%	.0%	1.6%	.0%
Zuken	.1	.0	.1	1	.4%	.3%	1.0%	.0%
Apple Computer	.1	.1	.0	19	.4%	.6%	.0%	.9%
Computervision	.1	.0	.0	1	.4%	.2%	.5%	.0%

(Continued)

Table 49 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Capilano Computing	.1	.0	.1	0	.2%	.0%	.8%	.0%
Number One Systems	.0	.0	.0	2	.1%	.0%	.3%	.1%
Ziegler Informatics	.0	.0	.0	0	.1%	.0%	.3%	.0%
PADS Software	.0	.0	.0	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.2%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.2%	.0%
Other Companies	2.1	2.1	.0	309	9.3%	14.7%	.0%	14.9%
All Companies	22.9	14.1	6.3	2,072	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	22.8	14.1	6.2	2,069	99.3%	99.7%	98.4%	99.9%
All Asian-Based Companies	.1	.0	.1	1	.4%	.3%	1.0%	.0%
All European-Based Companies	.1	.0	.0	2	.2%	.0%	.6%	.1%
All Hardware Companies	15.5	13.7	.0	2,054	67.5%	97.0%	.0%	99.1%
All Turnkey & SW Companies	7.4	.4	6.3	18	32.5%	3.0%	100.0%	.9%

Source: Dataquest (September 1992)

Table 50
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	1.8	1.6	.0	121	24.9%	44.2%	.0%	36.3%
Hewlett-Packard	1.5	1.2	.0	165	20.1%	34.0%	.0%	49.8%
LSI Logic	.7	.1	.5	2	9.7%	2.0%	20.5%	.5%
Genrad	.7	.1	.5	7	9.3%	3.7%	17.4%	2.0%
Digital	.6	.4	.0	24	7.7%	11.0%	.0%	7.1%
Analogy	.5	.0	.5	0	6.9%	.0%	17.4%	.0%
COMPASS Design Automation-VLSI	.4	.0	.3	1	5.5%	.6%	12.0%	.2%
Comdisco Systems	.3	.0	.3	0	4.0%	.0%	10.1%	.0%
EEsof	.2	.0	.2	0	3.3%	.0%	7.8%	.1%
Intergraph	.2	.1	.0	3	2.4%	2.5%	1.2%	.8%
Compact Software	.1	.0	.1	0	1.7%	.0%	4.7%	.0%
Zuken	.1	.0	.1	1	1.4%	1.1%	2.3%	.2%
Computervision	.1	.0	.0	1	1.2%	.8%	1.2%	.3%
ACTEL	.1	.0	.1	0	.8%	.0%	2.3%	.0%
Data I/O	.1	.0	.1	0	.8%	.0%	2.3%	.0%
Autodesk	.0	.0	.0	0	.3%	.0%	.8%	.0%
Other Companies	.0	.0	.0	10	.0%	.0%	.0%	2.9%
All Companies	7.2	3.5	2.6	332	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.1	3.5	2.5	332	98.6%	98.9%	97.7%	99.8%
All Asian-Based Companies	.1	.0	.1	1	1.4%	1.1%	2.3%	.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.8	3.2	.0	319	52.7%	89.2%	.0%	96.0%
All Turnkey & SW Companies	3.4	.4	2.6	13	47.3%	10.8%	100.0%	4.0%

Source: Dataquest (September 1992)

Table 51

1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.7	1.2	.0	0	51.2%	49.8%	.0%	.0%
Genrad	.1	.0	.1	0	2.4%	.4%	17.2%	.5%
Teradyne	.1	.0	.1	0	2.4%	.0%	20.7%	.0%
LSI Logic	.1	.0	.1	0	2.4%	.4%	17.2%	.4%
Compact Software	.1	.0	.1	0	2.1%	.0%	24.1%	.0%
Intergraph	.0	.0	.0	0	1.2%	.4%	3.4%	1.0%
Analogy	.0	.0	.0	0	.9%	.0%	6.9%	.0%
EEsof	.0	.0	.0	0	.6%	.0%	3.4%	.0%
Data I/O	.0	.0	.0	0	.3%	.0%	3.4%	.0%
COMPASS Design Automation-VLSI	.0	.0	.0	0	.3%	.4%	3.4%	.0%
Other Companies	1.2	1.1	.0	47	36.1%	48.5%	.0%	98.2%
All Companies	3.3	2.4	.3	48	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.3	2.4	.3	48	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.9	2.3	.0	47	87.3%	98.3%	.0%	98.2%
All Turnkey & SW Companies	.4	.0	.3	1	12.7%	1.7%	100.0%	1.8%

Source: Dataquest (September 1992)

Table 52
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Server
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	.8	.6	.0	6	60.6%	57.3%	.0%	13.7%
Sun Microsystems	.3	.3	.0	15	24.2%	27.1%	.0%	32.6%
Hewlett-Packard	.1	.1	.0	8	8.3%	9.4%	.0%	17.4%
IBM	.1	.1	.0	11	3.8%	5.2%	.0%	24.2%
Intergraph	.0	.0	.0	1	3.0%	1.0%	100.0%	1.1%
Other Companies	.0	.0	.0	5	.0%	.0%	.0%	11.0%
All Companies	1.3	1.0	.0	47	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.3	1.0	.0	47	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.3	1.0	.0	46	97.0%	99.0%	.0%	98.9%
All Turnkey & SW Companies	.0	.0	.0	1	3.0%	1.0%	100.0%	1.1%

Source: Dataquest (September 1992)

Table 53
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	3.8	3.8	.0	750	34.8%	52.6%	.0%	45.6%
IBM	2.3	2.2	.0	556	21.2%	30.4%	.0%	33.8%
Orcad	1.3	.0	1.3	0	11.9%	.0%	38.9%	.0%
Altera	.7	.0	.6	0	6.2%	.0%	17.2%	.0%
Xilinx	.3	.0	.3	0	2.9%	.0%	8.6%	.0%
Hewlett-Packard	.3	.2	.0	69	2.5%	3.0%	.0%	4.2%
Data I/O	.3	.0	.3	0	2.5%	.0%	8.3%	.0%
ACTEL	.3	.0	.2	0	2.3%	.0%	6.8%	.0%
Autodesk	.2	.0	.2	0	1.5%	.0%	5.0%	.0%
EEsof	.2	.0	.1	0	1.4%	.0%	4.2%	.0%
Spectrum Software	.1	.0	.1	0	.9%	.0%	3.0%	.0%
Compact Software	.1	.0	.1	0	.9%	.0%	3.0%	.0%
Apple Computer	.1	.1	.0	19	.8%	1.1%	.0%	1.2%
Capilano Computing	.1	.0	.1	0	.5%	.0%	1.5%	.0%
Number One Systems	.0	.0	.0	2	.3%	.0%	.6%	.1%
Teradyne	.0	.0	.0	0	.3%	.0%	.9%	.0%
Ziegler Informatics	.0	.0	.0	0	.2%	.0%	.6%	.0%
PADS Software	.0	.0	.0	0	.2%	.0%	.3%	.0%
Genrad	.0	.0	.0	1	.2%	.0%	.6%	.1%
American Small Business Comp.	.0	.0	.0	0	.1%	.0%	.3%	.0%
Accel Technologies	.0	.0	.0	0	.1%	.0%	.3%	.0%

(Continued)

Table 53 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.9	.9	.0	247	8.5%	12.9%	.0%	15.0%
All Companies	11.1	7.3	3.4	1,644	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.0	7.3	3.3	1,642	99.5%	100.0%	98.8%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.1	.0	.0	2	.5%	.0%	1.2%	.1%
All Hardware Companies	7.5	7.3	.0	1,641	67.8%	100.0%	.0%	99.8%
All Turnkey & SW Companies	3.6	.0	3.4	3	32.2%	.0%	100.0%	.2%

Source: Dataquest (September 1992)

Table 54
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
Platform: All Platforms
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	164.6	141.7	.0	9,743	28.6%	53.6%	.0%	64.4%
Cadence	134.1	.0	111.3	0	23.3%	.0%	56.9%	.0%
Mentor Graphics	91.1	26.5	33.7	876	15.9%	10.0%	17.2%	5.8%
Digital	62.1	42.8	.0	610	10.8%	16.2%	.0%	4.0%
Seiko Instruments—NO OEM	30.0	12.9	13.7	184	5.2%	4.9%	7.0%	1.2%
Fujitsu	13.3	12.0	.0	299	2.3%	4.5%	.0%	2.0%
Valid	12.2	.3	9.0	29	2.1%	.1%	4.6%	.2%
Hewlett-Packard	10.9	8.9	.0	1,532	1.9%	3.4%	.0%	10.1%
Solbourne	10.6	10.4	.0	1,015	1.8%	3.9%	.0%	6.7%
COMPASS Design Automation-VLSI	10.1	.6	7.9	13	1.8%	.2%	4.0%	.1%
Silvar-Lisco	9.5	.0	5.2	0	1.7%	.0%	2.7%	.0%
Cascade Design Automation	4.4	.0	3.0	0	.8%	.0%	1.6%	.0%
Sagantec	4.0	.0	3.6	0	.7%	.0%	1.8%	.0%
NEC	3.4	1.9	1.3	107	.6%	.7%	.6%	.7%
Integrated Silicon Systems	3.0	.5	2.5	18	.5%	.2%	1.3%	.1%
LSI Logic	1.9	.2	1.4	5	.3%	.1%	.7%	.0%
Ontos	1.3	.0	1.3	0	.2%	.0%	.6%	.0%
Everex Systems	1.2	1.2	.0	479	.2%	.4%	.0%	3.2%
Sony	1.1	1.0	.0	64	.2%	.4%	.0%	.4%
Tanner Research	1.0	.0	.9	0	.2%	.0%	.4%	.0%
National Semiconductor	.4	.1	.3	4	.1%	.0%	.2%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.2%	.0%
Objectivity	.3	.0	.3	0	.1%	.0%	.2%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 54 (Continued)

1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	3.9	3.8	.0	154	.7%	1.4%	.0%	1.0%
All Companies	574.7	264.5	195.8	15,133	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	522.8	236.8	177.2	14,479	91.0%	89.5%	90.5%	95.7%
All Asian-Based Companies	47.8	27.7	14.9	654	8.3%	10.5%	7.6%	4.3%
All European-Based Companies	4.0	.0	3.6	0	.7%	.0%	1.9%	.0%
All Hardware Companies	254.4	209.7	.0	13,598	44.3%	79.3%	.0%	89.9%
All Turnkey & SW Companies	320.3	54.8	195.8	1,535	55.7%	20.7%	100.0%	10.1%

Source: Dataquest (September 1992)

Table 55
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	148.1	128.3	.0	9,122	31.8%	66.1%	.0%	69.5%
Cadence	119.3	.0	99.1	0	25.6%	.0%	54.8%	.0%
Mentor Graphics	91.1	26.5	33.7	876	19.6%	13.6%	18.6%	6.7%
Seiko Instruments—NO. OEM	26.7	11.5	12.5	171	5.7%	5.9%	6.9%	1.3%
Valid	12.2	.3	9.0	29	2.6%	.1%	5.0%	.2%
Digital	11.2	7.7	.0	479	2.4%	4.0%	.0%	3.6%
COMPASS Design Automation—VLSI	9.9	.4	7.6	13	2.1%	.2%	4.2%	.1%
Hewlett-Packard	9.8	8.0	.0	1,449	2.1%	4.1%	.0%	11.0%
Silvar-Lisco	9.5	.0	5.2	0	2.0%	.0%	2.9%	.0%
Fujitsu	5.5	4.9	.0	132	1.2%	2.5%	.0%	1.0%
Cascade Design Automation	4.4	.0	3.0	0	.9%	.0%	1.7%	.0%
Sagantec	4.0	.0	3.6	0	.9%	.0%	2.0%	.0%
NEC	3.4	1.9	1.3	107	.7%	1.0%	.7%	.8%
Solbourne	3.2	3.1	.0	641	.7%	1.6%	.0%	4.9%
Integrated Silicon Systems	2.5	.3	2.1	10	.5%	.2%	1.2%	.1%
LSI Logic	1.7	.2	1.3	4	.4%	.1%	.7%	.0%
Ontos	1.3	.0	1.3	0	.3%	.0%	.7%	.0%
Sony	1.1	1.0	.0	64	.2%	.5%	.0%	.5%
Object Design	.3	.0	.3	0	.1%	.0%	.2%	.0%
National Semiconductor	.3	.1	.3	4	.1%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.1%	.0%	.2%	.0%
Everex Systems	.1	.1	.0	22	.0%	.1%	.0%	.2%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 55 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	465.8	194.1	180.7	13,123	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	425.1	174.9	163.2	12,649	91.3%	90.1%	90.3%	96.4%
All Asian-Based Companies	36.7	19.2	13.8	475	7.9%	9.9%	7.6%	3.6%
All European-Based Companies	4.0	.0	3.6	0	.9%	.0%	2.0%	.0%
All Hardware Companies	173.5	148.2	.0	11,777	37.2%	76.3%	.0%	89.7%
All Turnkey & SW Companies	292.4	45.9	180.7	1,347	62.8%	23.7%	100.0%	10.3%

Source: Dataquest (September 1992)

Table 56
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	34.8	24.0	.0	0	66.7%	69.5%	.0%	.0%
Fujitsu	5.7	5.2	.0	96	10.9%	14.9%	.0%	36.4%
Cadence	4.0	.0	3.3	0	7.7%	.0%	68.6%	.0%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	6.3%	4.1%	23.0%	4.8%
LSI Logic	.2	.0	.2	0	.4%	.1%	3.3%	.2%
COMPASS Design Automation-VLSI	.2	.2	.3	0	.3%	.5%	5.1%	.1%
Other Companies	3.9	3.8	.0	154	7.6%	10.9%	.0%	58.4%
All Companies	52.2	34.5	4.9	264	100.0%	100.0%	100.0%	100.0%
 All N.A.-Based Companies	 43.1	 27.9	 3.8	 155	 82.7%	 80.9%	 77.0%	 58.8%
All Asian-Based Companies	9.0	6.6	1.1	109	17.3%	19.1%	23.0%	41.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	38.7	27.8	.0	154	74.3%	80.4%	.0%	58.4%
All Turnkey & SW Companies	13.4	6.8	4.9	110	25.7%	19.6%	100.0%	41.6%

Source: Dataquest (September 1992)

Table 57
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	16.5	13.4	.0	621	31.7%	41.0%	.0%	51.4%
Digital	16.2	11.1	.0	131	31.1%	34.0%	.0%	10.9%
Cadence	10.8	.0	9.0	0	20.8%	.0%	100.0%	.0%
Solbourne	7.4	7.3	.0	374	14.3%	22.2%	.0%	30.9%
Hewlett-Packard	1.1	.9	.0	83	2.1%	2.7%	.0%	6.9%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	51.9	32.7	9.0	1,209	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	51.9	32.7	9.0	1,209	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	41.1	32.7	.0	1,209	79.2%	100.0%	.0%	100.0%
All Turnkey & SW Companies	10.8	.0	9.0	0	20.8%	.0%	100.0%	.0%

Source: Dataquest (September 1992)

Table 58
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	2.1	1.9	.0	71	44.7%	60.8%	.0%	13.2%
Everex Systems	1.0	1.0	.0	458	21.6%	32.8%	.0%	85.3%
Tanner Research	1.0	.0	.9	0	20.6%	.0%	67.2%	.0%
Integrated Silicon Systems	.6	.2	.4	8	12.2%	6.4%	29.7%	1.5%
National Semiconductor	.0	.0	.0	0	.8%	.0%	3.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	4.8	3.1	1.3	536	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.6	1.2	1.3	466	55.3%	39.2%	100.0%	86.8%
All Asian-Based Companies	2.1	1.9	.0	71	44.7%	60.8%	.0%	13.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.0	1.0	.0	458	21.6%	32.8%	.0%	85.3%
All Turnkey & SW Companies	3.7	2.1	1.3	79	78.4%	67.2%	100.0%	14.7%

Source: Dataquest (September 1992)

Table 59
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	79.2	68.2	.0	5,167	33.5%	58.0%	.0%	66.7%
Cadence	49.3	.0	33.0	0	20.8%	.0%	52.6%	.0%
Mentor Graphics	43.7	13.8	15.1	420	18.5%	11.7%	24.0%	5.4%
Digital	29.8	20.6	.0	290	12.6%	17.5%	.0%	3.7%
Solbourne	7.4	7.3	.0	682	3.1%	6.2%	.0%	8.8%
COMPASS Design Automation-VLSI	5.2	.3	4.1	7	2.2%	.3%	6.6%	.1%
Hewlett-Packard	4.6	3.8	.0	644	1.9%	3.2%	.0%	8.3%
Valid	3.5	.2	2.4	24	1.5%	.1%	3.9%	.3%
Cascade Design Automation	2.6	.0	1.8	0	1.1%	.0%	2.9%	.0%
Silvar-Lisco	2.5	.0	1.4	0	1.0%	.0%	2.2%	.0%
Integrated Silicon Systems	1.8	.3	1.4	10	.7%	.3%	2.3%	.1%
Ontos	1.2	.0	1.2	0	.5%	.0%	1.9%	.0%
LSI Logic	1.2	.1	.9	3	.5%	.1%	1.4%	.0%
Everex Systems	1.0	1.0	.0	417	.4%	.9%	.0%	5.4%
Tanner Research	.8	.0	.7	0	.3%	.0%	1.1%	.0%
National Semiconductor	.3	.0	.2	3	.1%	.0%	.4%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.4%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.4%	.0%

(Continued)

Table 39 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	2.1	2.0	.0	83	.9%	1.7%	.0%	1.1%
All Companies	236.7	117.6	62.8	7,750	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	236.7	117.6	62.8	7,750	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	124.2	102.8	.0	7,283	52.5%	87.5%	.0%	94.0%
All Turnkey & SW Companies	112.5	14.7	62.8	467	47.5%	12.5%	100.0%	6.0%

Source: Dataquest (September 1992)

Table 60
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	71.3	61.8	.0	4,786	37.8%	72.1%	.0%	73.3%
Cadence	43.8	.0	29.4	0	23.2%	.0%	50.7%	.0%
Mentor Graphics	43.7	13.8	15.1	420	23.2%	16.1%	26.0%	6.4%
Digital	5.4	3.7	.0	228	2.8%	4.3%	.0%	3.5%
COMPASS Design Automation-VLSI	5.1	.2	4.0	7	2.7%	.2%	6.9%	.1%
Hewlett-Packard	4.1	3.4	.0	609	2.2%	3.9%	.0%	9.3%
Valid	3.5	.2	2.4	24	1.8%	.2%	4.2%	.4%
Cascade Design Automation	2.6	.0	1.8	0	1.4%	.0%	3.2%	.0%
Silvar-Lisco	2.5	.0	1.4	0	1.3%	.0%	2.3%	.0%
Solbourne	2.2	2.2	.0	430	1.2%	2.5%	.0%	6.6%
Integrated Silicon Systems	1.4	.2	1.2	6	.7%	.2%	2.1%	.1%
Ontos	1.2	.0	1.2	0	.6%	.0%	2.1%	.0%
LSI Logic	1.0	.1	.8	3	.5%	.1%	1.3%	.0%
National Semiconductor	.3	.0	.2	3	.1%	.0%	.4%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.4%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.4%	.0%
Everex Systems	.1	.1	.0	19	.1%	.1%	.0%	.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	188.8	85.6	57.9	6,533	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	188.8	85.6	57.9	6,533	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	83.1	71.1	.0	6,071	44.0%	83.1%	.0%	92.9%
All Turnkey & SW Companies	105.7	14.5	57.9	462	56.0%	16.9%	100.0%	7.1%

Source: Dataquest (September 1992)

Table 61
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	16.7	11.5	.0	0	81.4%	84.6%	.0%	.0%
Cadence	1.5	.0	1.0	0	7.2%	.0%	80.5%	.0%
LSI Logic	.1	.0	.1	0	.6%	.1%	8.1%	.3%
COMPASS Design Automation-VLSI	.1	.1	.1	0	.5%	.7%	11.4%	.2%
Other Companies	2.1	2.0	.0	83	10.3%	14.7%	.0%	99.5%
All Companies	20.5	13.6	1.2	83	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	20.5	13.6	1.2	83	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	18.8	13.5	.0	83	91.7%	99.3%	.0%	99.5%
All Turnkey & SW Companies	1.7	.1	1.2	0	8.3%	.7%	100.0%	.5%

Source: Dataquest (September 1992)

Table 62
1991 CAD/CAM/CAB/GIS Final Market Share

Application: IC Layout
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	7.9	6.5	.0	382	31.3%	37.4%	.0%	52.2%
Digital	7.8	5.4	.0	63	30.6%	30.9%	.0%	8.6%
Solbourne	5.2	5.1	.0	252	20.5%	29.4%	.0%	34.4%
Cadence	4.0	.0	2.7	0	15.7%	.0%	100.0%	.0%
Hewlett-Packard	.5	.4	.0	35	1.8%	2.2%	.0%	4.8%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	25.3	17.3	2.7	731	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	25.3	17.3	2.7	731	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	21.3	17.3	.0	731	84.3%	100.0%	.0%	100.0%
All Turnkey & SW Companies	4.0	.0	2.7	0	15.7%	.0%	100.0%	.0%

Source: Dataquest (September 1992)

Table 63
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Everex Systems	.9	.9	.0	398	43.7%	88.2%	.0%	98.8%
Tanner Research	.8	.0	.7	0	37.9%	.0%	72.6%	.0%
Integrated Silicon Systems	.4	.1	.2	5	17.0%	11.8%	24.2%	1.2%
National Semiconductor	.0	.0	.0	0	1.5%	.0%	3.2%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2.1	1.0	1.0	403	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.1	1.0	1.0	403	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.9	.9	.0	398	43.7%	88.2%	.0%	98.8%
All Turnkey & SW Companies	1.2	.1	1.0	5	56.3%	11.8%	100.0%	1.2%

Source: Dataquest (September 1992)

Table 64
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	41.4	35.6	.0	2,126	30.8%	53.2%	.0%	59.0%
Mentor Graphics	26.4	6.6	10.8	254	19.7%	9.9%	31.7%	7.1%
Digital	24.9	17.1	.0	247	18.5%	25.6%	.0%	6.9%
Cadence	19.8	.0	13.2	0	14.7%	.0%	38.7%	.0%
Hewlett-Packard	4.6	3.7	.0	644	3.4%	5.6%	.0%	17.9%
Sagantec	4.0	.0	3.6	0	3.0%	.0%	10.5%	.0%
Valid	2.9	.1	1.9	6	2.2%	.1%	5.5%	.2%
COMPASS Design Automation-VLSI	2.7	.2	2.1	4	2.0%	.2%	6.2%	.1%
Silvar-Lisco	2.6	.0	1.4	0	1.9%	.0%	4.2%	.0%
Solbourne	2.3	2.3	.0	222	1.7%	3.4%	.0%	6.2%
LSI Logic	.5	.1	.4	1	.4%	.1%	1.1%	.0%
Cascade Design Automation	.4	.0	.3	0	.3%	.0%	.9%	.0%
Integrated Silicon Systems	.2	.0	.1	1	.1%	.0%	.4%	.0%
Tanner Research	.2	.0	.1	0	.1%	.0%	.4%	.0%
Everex Systems	.1	.1	.0	48	.1%	.2%	.0%	1.3%
National Semiconductor	.1	.0	.1	1	.1%	.0%	.2%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.2%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.1%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.1%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 64 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	1.2	1.2	.0	48	.9%	1.8%	.0%	1.3%
All Companies	134.4	67.0	34.2	3,601	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	130.3	67.0	30.6	3,601	97.0%	100.0%	89.4%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.0	.0	3.6	0	3.0%	.0%	10.6%	.0%
All Hardware Companies	74.5	60.1	.0	3,335	55.5%	89.7%	.0%	92.6%
All Turnkey & SW Companies	59.9	6.9	34.2	266	44.5%	10.3%	100.0%	7.4%

Source: Dataquest (September 1992)

Table 65
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	37.2	32.3	.0	2,027	35.8%	69.7%	.0%	62.6%
Mentor Graphics	26.4	6.6	10.8	254	25.4%	14.3%	33.4%	7.8%
Cadence	17.6	.0	11.8	0	16.9%	.0%	36.2%	.0%
Digital	4.5	3.1	.0	194	4.3%	6.7%	.0%	6.0%
Hewlett-Packard	4.1	3.4	.0	609	4.0%	7.3%	.0%	18.8%
Sagantec	4.0	.0	3.6	0	3.8%	.0%	11.1%	.0%
Valid	2.9	.1	1.9	6	2.8%	.2%	5.8%	.2%
COMPASS Design Automation-VLSI	2.7	.1	2.1	3	2.6%	.2%	6.3%	.1%
Silvar-Lisco	2.6	.0	1.4	0	2.5%	.0%	4.4%	.0%
Solbourne	.7	.7	.0	140	.7%	1.5%	.0%	4.3%
Cascade Design Automation	.4	.0	.3	0	.4%	.0%	.9%	.0%
LSI Logic	.4	.0	.3	1	.4%	.1%	1.0%	.0%
Integrated Silicon Systems	.1	.0	.1	0	.1%	.0%	.3%	.0%
National Semiconductor	.1	.0	.1	1	.1%	.0%	.2%	.0%
Ontos	.1	.0	.1	0	.1%	.0%	.2%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.1%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.1%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.1%	.0%
Everex Systems	.0	.0	.0	2	.0%	.0%	.0%	.1%

(Continued)

Table 65 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	103.9	46.3	32.5	3,237	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	99.9	46.3	28.8	3,237	96.1%	100.0%	88.8%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	4.0	.0	3.6	0	3.9%	.0%	11.2%	.0%
All Hardware Companies	46.5	39.4	.0	2,972	44.8%	85.2%	.0%	91.8%
All Turnkey & SW Companies	57.4	6.9	32.5	265	55.2%	14.8%	100.0%	8.2%

Source: Dataquest (September 1992)

Table 66
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	13.9	9.6	.0	0	87.9%	88.6%	.0%	.0%
Cadence	.6	.0	.4	0	3.7%	.0%	78.4%	.0%
LSI Logic	.1	.0	.0	0	.3%	.1%	7.8%	.2%
COMPASS Design Automation-VLSI	.1	.0	.1	0	.3%	.4%	13.7%	.2%
Other Companies	1.2	1.2	.0	48	7.8%	11.0%	.0%	99.5%
All Companies	15.8	10.8	.5	49	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	15.8	10.8	.5	49	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	15.2	10.8	.0	48	95.6%	99.5%	.0%	99.5%
All Turnkey & SW Companies	.7	.1	.5	0	4.4%	.5%	100.0%	.5%

Source: Dataquest (September 1992)

Table 67

1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout

Platform: Server

Region: Europe

Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	6.5	4.4	.0	53	45.2%	45.3%	.0%	19.8%
Sun Microsystems	4.2	3.4	.0	99	29.0%	34.5%	.0%	36.9%
Solbourne	1.6	1.6	.0	82	11.4%	16.4%	.0%	30.4%
Cadence	1.6	.0	1.1	0	11.2%	.0%	100.0%	.0%
Hewlett-Packard	.5	.4	.0	35	3.2%	3.8%	.0%	12.9%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	14.3	9.8	1.1	269	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	14.3	9.8	1.1	269	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	12.7	9.8	.0	269	88.8%	100.0%	.0%	100.0%
All Turnkey & SW Companies	1.6	.0	1.1	0	11.2%	.0%	100.0%	.0%

Source: Dataquest (September 1992)

Table 68
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Tanner Research	.2	.0	.1	0	51.7%	.0%	81.3%	.0%
Everex Systems	.1	.1	.0	46	34.5%	90.9%	.0%	99.1%
Integrated Silicon Systems	.0	.0	.0	0	10.3%	9.1%	12.5%	.9%
National Semiconductor	.0	.0	.0	0	3.4%	.0%	6.3%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	.3	.1	.2	46	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	.3	.1	.2	46	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.1	.1	.0	46	34.5%	90.9%	.0%	99.1%
All Turnkey & SW Companies	.2	.0	.2	0	65.5%	9.1%	100.0%	.9%

Source: Dataquest (September 1992)

Table 69
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	65.1	.0	65.1	0	32.6%	.0%	66.1%	.0%
Sun Microsystems	42.3	36.4	.0	2,345	21.2%	47.5%	.0%	65.6%
Seiko Instruments—NO OEM	30.0	12.9	13.7	184	15.0%	16.8%	13.9%	5.2%
Mentor Graphics	21.0	6.1	7.8	201	10.5%	7.9%	7.9%	5.6%
Fujitsu	13.3	12.0	.0	299	6.7%	15.6%	.0%	8.4%
Valid	5.8	.0	4.7	0	2.9%	.0%	4.8%	.0%
Digital	5.6	3.8	.0	54	2.8%	5.0%	.0%	1.5%
Silvar-Lisco	4.5	.0	2.5	0	2.2%	.0%	2.5%	.0%
NEC	3.4	1.9	1.3	107	1.7%	2.4%	1.3%	3.0%
COMPASS Design Automation-VLSI	1.9	.1	1.5	3	1.0%	.1%	1.5%	.1%
Hewlett-Packard	1.4	1.1	.0	199	.7%	1.5%	.0%	5.6%
Cascade Design Automation	1.3	.0	.9	0	.7%	.0%	.9%	.0%
Integrated Silicon Systems	1.1	.2	.9	7	.6%	.2%	.9%	.2%
Sony	1.1	1.0	.0	64	.6%	1.2%	.0%	1.8%
Solbourne	.8	.8	.0	78	.4%	1.1%	.0%	2.2%
LSI Logic	.2	.0	.1	0	.1%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Tanner Research	.1	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	14	.0%	.0%	.0%	.4%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 69 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.4	.4	.0	17	.2%	.5%	.0%	.5%
All Companies	199.3	76.8	98.5	3,572	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	151.5	49.1	83.6	2,918	76.0%	63.9%	84.8%	81.7%
All Asian-Based Companies	47.8	27.7	14.9	654	24.0%	36.1%	15.2%	18.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	51.7	43.6	.0	2,771	25.9%	56.9%	.0%	77.6%
All Turnkey & SW Companies	147.6	33.1	98.5	801	74.1%	43.1%	100.0%	22.4%

Source: Dataquest (September 1992)

Table 70
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	57.9	.0	57.9	0	33.9%	.0%	64.3%	.0%
Sun Microsystems	38.1	33.0	.0	2,212	22.3%	54.6%	.0%	69.7%
Seiko Instruments—NO OEM	26.7	11.5	12.5	171	15.6%	19.0%	13.9%	5.4%
Mentor Graphics	21.0	6.1	7.8	201	12.3%	10.0%	8.6%	6.3%
Valid	5.8	.0	4.7	0	3.4%	.0%	5.2%	.0%
Fujitsu	5.5	4.9	.0	132	3.2%	8.1%	.0%	4.2%
Silvar-Lisco	4.5	.0	2.5	0	2.6%	.0%	2.7%	.0%
NEC	3.4	1.9	1.3	107	2.0%	3.1%	1.4%	3.4%
COMPASS Design Automation-VLSI	1.9	.1	1.5	2	1.1%	.1%	1.6%	.1%
Cascade Design Automation	1.3	.0	.9	0	.8%	.0%	1.0%	.0%
Hewlett-Packard	1.3	1.0	.0	188	.7%	1.7%	.0%	5.9%
Sony	1.1	1.0	.0	64	.6%	1.6%	.0%	2.0%
Digital	1.0	.7	.0	42	.6%	1.1%	.0%	1.3%
Integrated Silicon Systems	.9	.1	.8	4	.5%	.2%	.9%	.1%
Solbourne	.3	.3	.0	49	.1%	.4%	.0%	1.5%
LSI Logic	.2	.0	.1	0	.1%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 70 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	1	.0%	.0%	.0%	.0%
All Companies	170.7	60.4	90.0	3,176	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	134.1	41.2	76.2	2,701	78.5%	68.2%	84.7%	85.1%
All Asian-Based Companies	36.7	19.2	13.8	475	21.5%	31.8%	15.3%	14.9%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	41.7	35.9	.0	2,557	24.4%	59.4%	.0%	80.5%
All Turnkey & SW Companies	129.0	24.5	90.0	619	75.6%	40.6%	100.0%	19.5%

Source: Dataquest (September 1992)

Table 71
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	5.7	5.2	.0	96	39.2%	56.3%	.0%	76.6%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	22.6%	15.5%	35.9%	10.1%
Digital	3.1	2.2	.0	0	21.5%	23.4%	.0%	.0%
Cadence	2.0	.0	2.0	0	13.4%	.0%	62.5%	.0%
COMPASS Design Automation-VLSI	.0	.0	.0	0	.2%	.3%	1.3%	.0%
LSI Logic	.0	.0	.0	0	.1%	.0%	.3%	.0%
Other Companies	.4	.4	.0	17	3.0%	4.5%	.0%	13.2%
All Companies	14.6	9.2	3.1	126	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.6	2.6	2.0	17	38.2%	28.2%	64.1%	13.3%
All Asian-Based Companies	9.0	6.6	1.1	109	61.8%	71.8%	35.9%	86.7%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.6	2.6	.0	17	24.4%	27.9%	.0%	13.2%
All Turnkey & SW Companies	11.0	6.6	3.1	109	75.6%	72.1%	100.0%	86.8%

Source: Dataquest (September 1992)

Table 72
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	5.2	.0	5.2	0	44.8%	.0%	100.0%	.0%
Sun Microsystems	4.2	3.5	.0	132	36.4%	67.1%	.0%	72.1%
Digital	1.5	1.0	.0	12	12.5%	19.6%	.0%	6.3%
Solbourne	.6	.6	.0	29	5.1%	11.3%	.0%	15.7%
Hewlett-Packard	.1	.1	.0	11	1.2%	1.9%	.0%	5.9%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	11.6	5.1	5.2	184	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.6	5.1	5.2	184	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	6.4	5.1	.0	184	55.2%	100.0%	.0%	100.0%
All Turnkey & SW Companies	5.2	.0	5.2	0	44.8%	.0%	100.0%	.0%

Source: Dataquest (September 1992)

Table 73
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	2.1	1.9	.0	71	88.4%	95.0%	.0%	81.0%
Integrated Silicon Systems	.2	.1	.1	3	8.3%	3.5%	76.5%	3.2%
Tanner Research	.1	.0	.0	0	2.1%	.0%	23.5%	.0%
Everex Systems	.0	.0	.0	14	1.2%	1.5%	.0%	15.8%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2.4	2.0	.2	87	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	.3	.1	.2	17	11.6%	5.0%	100.0%	19.0%
All Asian-Based Companies	2.1	1.9	.0	71	88.4%	95.0%	.0%	81.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.0	.0	.0	14	1.2%	1.5%	.0%	15.8%
All Turnkey & SW Companies	2.4	2.0	.2	73	98.8%	98.5%	100.0%	84.2%

Source: Dataquest (September 1992)

Table 74
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.9	1.3	.0	18	43.6%	40.9%	.0%	8.6%
Sun Microsystems	1.6	1.4	.0	105	37.9%	44.4%	.0%	50.2%
Hewlett-Packard	.3	.3	.0	46	7.5%	8.9%	.0%	21.9%
COMPASS Design Automation-VLSI	.2	.0	.2	0	4.7%	.3%	68.2%	.1%
LSI Logic	.1	.0	.1	0	2.3%	.3%	31.8%	.1%
Other Companies	.2	.2	.0	40	4.0%	5.1%	.0%	19.1%
All Companies	4.3	3.1	.2	210	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4.3	3.1	.2	210	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.0	3.1	.0	210	93.0%	99.4%	.0%	99.8%
All Turnkey & SW Companies	.3	.0	.2	1	7.0%	.6%	100.0%	.2%

Source: Dataquest (September 1992)

Table 75
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
Platform: Technical Workstation
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	1.5	1.3	.0	98	61.3%	71.6%	.0%	54.9%
Digital	.3	.2	.0	14	14.3%	13.1%	.0%	8.0%
Hewlett-Packard	.3	.3	.0	43	12.2%	14.2%	.0%	24.4%
COMPASS Design Automation-VLSI	.2	.0	.2	0	8.4%	.6%	71.4%	.1%
LSI Logic	.1	.0	.1	0	3.8%	.6%	28.6%	.1%
Other Companies	.0	.0	.0	22	.0%	.0%	.0%	12.4%
All Companies	2.4	1.8	.2	178	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.4	1.8	.2	178	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.1	1.7	.0	177	87.8%	98.9%	.0%	99.7%
All Turnkey & SW Companies	.3	.0	.2	0	12.2%	1.1%	100.0%	.3%

Source: Dataquest (September 1992)

Table 76
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.0	.7	.0	0	85.2%	81.8%	.0%	.0%
LSI Logic	.0	.0	.0	0	.8%	.0%	100.0%	.3%
Other Companies	.2	.2	.0	7	13.9%	18.2%	.0%	99.7%
All Companies	1.2	.9	.0	7	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.2	.9	.0	7	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.2	.9	.0	7	99.2%	100.0%	.0%	99.6%
All Turnkey & SW Companies	.0	.0	.0	0	.8%	.0%	100.0%	.4%

Source: Dataquest (September 1992)

Table 77

1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Server
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	.5	.3	.0	4	71.6%	67.3%	.0%	15.3%
Sun Microsystems	.2	.1	.0	8	23.9%	26.5%	.0%	30.5%
Hewlett-Packard	.0	.0	.0	2	4.5%	6.1%	.0%	9.8%
Other Companies	.0	.0	.0	11	.0%	.0%	.0%	44.5%
All Companies	.7	.5	.0	26	100.0%	100.0%	.0%	100.0%
All N.A.-Based Companies	.7	.5	.0	26	100.0%	100.0%	.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.7	.5	.0	26	100.0%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%

Source: Dataquest (September 1992)

Table 78
1991 CAD/CAM/CAE/GIS Final Market Share

Application: IC Layout
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	.0	.0%	.0%	.0%	.0%
All Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All N.A.-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Turnkey & SW Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%

Source: Dataquest (September 1992)

Table 79
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	
Digital	127.8	85.3	2.7	1,227	11.8%	15.2%	.8%	3.4%	
Sun Microsystems	112.2	96.6	.0	6,640	10.3%	17.2%	.0%	18.4%	
Mentor Graphics	107.0	29.8	39.5	1,028	9.8%	5.3%	12.0%	2.8%	
Zuken	83.8	33.5	50.3	489	7.7%	6.0%	15.3%	1.4%	
Intergraph	54.4	15.4	17.3	570	5.0%	2.7%	5.3%	1.6%	
Hewlett-Packard	53.9	40.1	.0	6,056	5.0%	7.1%	.0%	16.7%	
IBM	52.0	31.3	11.5	2,622	4.8%	5.6%	3.5%	7.2%	
Racal-Redac	51.8	.0	42.1	0	4.8%	.0%	12.8%	.0%	
Valid	50.2	1.9	35.3	228	4.6%	.3%	10.8%	.6%	
Uchida Yoko	36.8	34.9	1.8	584	3.4%	6.2%	.6%	1.6%	
Compaq	32.1	32.1	.0	6,267	3.0%	5.7%	.0%	17.3%	
Sharp System Products—NO OEM	31.2	16.2	15.0	186	2.9%	2.9%	4.6%	.5%	
Fujitsu	31.0	19.5	8.4	698	2.9%	3.5%	2.5%	1.9%	
Harris EDA	24.5	2.8	13.9	123	2.3%	.5%	4.2%	.3%	
CADIX	22.6	9.0	11.3	166	2.1%	1.6%	3.4%	.5%	
NEC	20.6	14.1	4.8	1,703	1.9%	2.5%	1.5%	4.7%	
Computervision	17.5	6.5	5.0	152	1.6%	1.2%	1.5%	.4%	
LPKF	15.0	9.8	3.8	650	1.4%	1.7%	1.1%	1.8%	
CADAM	13.0	3.0	8.5	600	1.2%	.5%	2.6%	1.7%	
Toshiba—NO OEM	11.6	5.8	4.6	131	1.1%	1.0%	1.4%	.4%	
Apple Computer	9.3	8.2	.0	1,940	.9%	1.4%	.0%	5.4%	
Hitachi	9.0	4.3	3.8	264	.8%	.8%	1.2%	.7%	
PADS Software	7.8	.0	6.6	0	.7%	.0%	2.0%	.0%	
Siemens Nixdorf Info systems	6.7	3.2	2.4	99	.6%	.6%	.7%	.3%	

(Continued)

Table 79 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	4.7	.0	3.6	0	.4%	.0%	1.1%	.0%
BETRONEX	4.6	.5	4.1	86	.4%	.1%	1.3%	.2%
Pacific Numerics	4.0	.0	4.0	0	.4%	.0%	1.2%	.0%
Solbourne	3.2	3.1	.0	298	.3%	.5%	.0%	.8%
Orcad	3.1	.0	3.1	0	.3%	.0%	.9%	.0%
Autodesk	2.8	.0	2.8	0	.3%	.0%	.9%	.0%
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.2%	.1%	.4%	.0%
Accel Technologies	2.3	.0	2.1	0	.2%	.0%	.6%	.0%
Dell Computer	2.2	2.2	.0	553	.2%	.4%	.0%	1.5%
CAD-UL	2.1	.0	2.1	0	.2%	.0%	.6%	.0%
Ziegler Informatics	2.0	.0	2.0	0	.2%	.0%	.6%	.0%
Sumitomo Denko Workstation	1.8	1.8	.0	100	.2%	.3%	.0%	.3%
Massteck	1.8	.0	1.8	0	.2%	.0%	.5%	.0%
Visionics	1.8	.0	1.3	7	.2%	.0%	.4%	.0%
Infinite Graphics	1.7	.0	1.7	0	.2%	.0%	.5%	.0%
Everex Systems	1.6	1.6	.0	639	.1%	.3%	.0%	1.8%
Century Research Center	1.4	.7	.5	8	.1%	.1%	.2%	.0%
DECAD	1.3	.2	.8	5	.1%	.0%	.2%	.0%
Ontos	1.3	.0	1.3	0	.1%	.0%	.4%	.0%
Research Machines	1.2	1.2	.0	194	.1%	.2%	.0%	.5%
Cadisys	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Sony	1.0	.9	.0	58	.1%	.2%	.0%	.2%
Royal Digital Systems	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Cooper & Chyan Technology	.8	.0	.8	0	.1%	.0%	.2%	.0%

(Continued)

Table 79 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compact Software	.7	.0	.7	0	.1%	.0%	.2%	.0%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.1%
ALS Design	.7	.0	.7	0	.1%	.0%	.2%	.0%
Seiko Instruments—NO OEM	.6	.3	.3	4	.1%	.0%	.1%	.0%
Vamp	.5	.0	.5	0	.0%	.0%	.2%	.0%
Number One Systems	.5	.1	.4	34	.0%	.0%	.1%	.1%
Andor	.4	.1	.2	3	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.1%	.0%
Oration	.3	.0	.3	0	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.0	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 79 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	47.5	45.1	.0	1,721	4.4%	8.0%	.0%	4.8%
All Companies	1,086.1	562.3	328.3	36,182	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	745.1	404.8	167.5	30,672	68.6%	72.0%	51.0%	84.8%
All Asian-Based Companies	254.1	142.0	102.2	4,407	23.4%	25.3%	31.1%	12.2%
All European-Based Companies	86.9	15.4	58.7	1,103	8.0%	2.7%	17.9%	3.0%
All Hardware Companies	402.7	330.2	.0	28,469	37.1%	58.7%	.0%	78.7%
All Turnkey & SW Companies	683.4	232.1	328.3	7,713	62.9%	41.3%	100.0%	21.3%

Source: Dataquest (September 1992)

Table 80
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	107.0	29.8	39.5	1,028	15.1%	9.6%	15.1%	6.7%
Sun Microsystems	101.0	87.4	.0	6,217	14.2%	28.2%	.0%	40.6%
Zuken	83.8	33.5	50.3	489	11.8%	10.8%	19.2%	3.2%
Valid	50.2	1.9	35.3	228	7.1%	.6%	13.5%	1.5%
Intergraph	50.1	13.3	16.4	509	7.1%	4.3%	6.3%	3.3%
Racal-Redac	49.9	.0	40.2	0	7.0%	.0%	15.4%	.0%
Hewlett-Packard	37.9	27.4	.0	3,114	5.3%	8.8%	.0%	20.4%
Uchida Yoko	36.8	34.9	1.8	584	5.2%	11.3%	.7%	3.8%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	3.8%	4.5%	5.0%	1.1%
Digital	25.1	15.1	2.0	963	3.5%	4.9%	.8%	6.3%
Harris EDA	23.8	2.6	13.3	117	3.4%	.8%	5.1%	.8%
CADIX	22.6	9.0	11.3	166	3.2%	2.9%	4.3%	1.1%
Computervision	17.5	6.5	5.0	152	2.5%	2.1%	1.9%	1.0%
Fujitsu	12.7	8.0	3.4	308	1.8%	2.6%	1.3%	2.0%
Toshiba—NO OEM	11.6	5.8	4.6	131	1.6%	1.9%	1.8%	.9%
NEC	10.9	6.0	4.0	341	1.5%	1.9%	1.5%	2.2%
IBM	7.0	3.6	1.8	185	1.0%	1.2%	.7%	1.2%
Siemens Nixdorf Info systems	6.7	3.2	2.4	99	1.0%	1.0%	.9%	.6%
Hitachi	4.5	2.2	1.9	89	.6%	.7%	.7%	.6%
Cadence	4.3	.0	3.3	0	.6%	.0%	1.3%	.0%
Pacific Numerics	3.8	.0	3.8	0	.5%	.0%	1.4%	.0%
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.4%	.3%	.5%	.1%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.2%	.5%	.0%	.6%
Century Research Center	1.4	.7	.5	8	.2%	.2%	.2%	.1%

(Continued)

Table 80 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Ontos	1.3	.0	1.3	0	.2%	.0%	.5%	.0%
DECAD	1.3	.2	.8	4	.2%	.1%	.3%	.0%
Sony	1.0	.9	.0	58	.1%	.3%	.0%	.4%
Royal Digital Systems	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Solbourne	.9	.8	.0	182	.1%	.3%	.0%	1.2%
Cooper & Chyan Technology	.8	.0	.8	0	.1%	.0%	.3%	.0%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.1%
Seiko Instruments—NO OEM	.6	.3	.3	4	.1%	.1%	.1%	.0%
Infinite Graphics	.3	.0	.3	0	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.1%	.0%
Compact Software	.3	.0	.3	0	.0%	.0%	.1%	.0%
Autodesk	.3	.0	.3	0	.0%	.0%	.1%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
Everex Systems	.2	.2	.0	29	.0%	.1%	.0%	.2%
Cadisys	.1	.0	.1	0	.0%	.0%	.0%	.0%
ALS Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	2	.0%	.0%	.0%	.0%

(Continued)

Table 80 (Continued)

1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	709.2	310.4	261.1	15,294	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	433.5	188.6	125.1	12,724	61.1%	60.8%	47.9%	83.2%
All Asian-Based Companies	217.1	117.9	92.4	2,448	30.6%	38.0%	35.4%	16.0%
All European-Based Companies	58.7	3.9	43.6	122	8.3%	1.2%	16.7%	.8%
All Hardware Companies	165.1	133.4	.0	10,652	23.3%	43.0%	.0%	69.7%
All Turnkey & SW Companies	544.1	176.9	261.1	4,642	76.7%	57.0%	100.0%	30.3%

Source: Dataquest (September 1992)

Table 81
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	69.9	47.8	.5	0	40.9%	38.9%	3.2%	.0%
IBM	35.5	19.1	9.4	466	20.8%	15.6%	61.8%	17.6%
Fujitsu	13.3	8.4	3.6	225	7.8%	6.8%	23.6%	8.5%
Hitachi	1.4	.7	.6	24	.8%	.6%	3.9%	.9%
Harris EDA	.7	.2	.6	6	.4%	.1%	3.7%	.2%
Intergraph	.7	.3	.1	10	.4%	.3%	.7%	.4%
Cadence	.4	.0	.3	0	.2%	.0%	1.8%	.0%
Compact Software	.2	.0	.2	0	.1%	.0%	1.1%	.0%
DECAD	.0	.0	.0	1	.0%	.0%	.1%	.0%
Kubota Computer	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	48.7	46.3	.0	1,914	28.5%	37.7%	.0%	72.3%
All Companies	170.9	122.8	15.2	2,646	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	156.1	113.7	11.0	2,396	91.3%	92.6%	72.4%	90.5%
All Asian-Based Companies	14.8	9.1	4.2	250	8.7%	7.4%	27.6%	9.4%
All European-Based Companies	.0	.0	.0	1	.0%	.0%	.1%	.0%
All Hardware Companies	118.0	94.1	.0	1,914	69.0%	76.6%	.0%	72.3%
All Turnkey & SW Companies	53.0	28.8	15.2	732	31.0%	23.4%	100.0%	27.7%

Source: Dataquest (September 1992)

Table 82
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	32.5	22.4	.0	264	57.4%	56.4%	.0%	25.6%
Sun Microsystems	11.2	9.2	.0	423	19.8%	23.0%	.0%	41.0%
Sharp System Products—NO OEM	4.1	2.1	1.9	18	7.2%	5.3%	62.6%	1.7%
Intergraph	3.6	1.7	.9	52	6.3%	4.3%	27.4%	5.0%
Solbourne	2.3	2.2	.0	116	4.0%	5.6%	.0%	11.3%
IBM	1.5	.9	.3	45	2.6%	2.2%	10.0%	4.3%
Hewlett-Packard	1.4	1.1	.0	104	2.4%	2.7%	.0%	10.0%
Sumitomo Denko Workstation	.1	.1	.0	11	.2%	.4%	.0%	1.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	56.6	39.7	3.1	1,032	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	52.4	37.5	1.2	1,004	92.6%	94.4%	37.4%	97.2%
All Asian-Based Companies	4.2	2.2	1.9	29	7.4%	5.6%	62.6%	2.8%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	47.7	35.2	.0	957	84.2%	88.6%	.0%	92.7%
All Turnkey & SW Companies	8.9	4.5	3.1	75	15.8%	11.4%	100.0%	7.3%

Source: Dataquest (September 1992)

Table 83
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	32.1	32.1	.0	6,267	21.5%	36.0%	.0%	36.4%
LPKF	15.0	9.8	3.8	650	10.0%	10.9%	7.7%	3.8%
Hewlett-Packard	14.6	11.6	.0	2,838	9.8%	13.0%	.0%	16.5%
CADAM	13.0	3.0	8.5	600	8.7%	3.4%	17.4%	3.5%
NEC	9.7	8.1	.8	1,362	6.5%	9.1%	1.6%	7.9%
Apple Computer	9.3	8.2	.0	1,940	6.2%	9.1%	.0%	11.3%
IBM	8.1	7.7	.0	1,926	5.4%	8.6%	.0%	11.2%
PADS Software	7.8	.0	6.6	0	5.2%	.0%	13.5%	.0%
Fujitsu	5.0	3.1	1.3	165	3.3%	3.5%	2.7%	1.0%
BETRONEX	4.6	.5	4.1	86	3.1%	.5%	8.4%	.5%
Orcad	3.1	.0	3.1	0	2.1%	.0%	6.3%	.0%
Hitachi	3.1	1.5	1.3	151	2.0%	1.6%	2.6%	.9%
Autodesk	2.6	.0	2.6	0	1.7%	.0%	5.2%	.0%
Accel Technologies	2.3	.0	2.1	0	1.5%	.0%	4.2%	.0%
Dell Computer	2.2	2.2	.0	553	1.4%	2.4%	.0%	3.2%
CAD-UL	2.1	.0	2.1	0	1.4%	.0%	4.2%	.0%
Ziegler Informatics	2.0	.0	2.0	0	1.3%	.0%	4.0%	.0%
Racal-Redac	1.9	.0	1.9	0	1.3%	.0%	3.9%	.0%
Visionics	1.8	.0	1.3	7	1.2%	.0%	2.7%	.0%
Massteck	1.8	.0	1.8	0	1.2%	.0%	3.6%	.0%
Everex Systems	1.4	1.4	.0	610	.9%	1.5%	.0%	3.5%
Infinite Graphics	1.3	.0	1.3	0	.9%	.0%	2.7%	.0%
Research Machines	1.2	1.2	.0	194	.8%	1.3%	.0%	1.1%
Cadisys	.9	.0	.9	0	.6%	.0%	1.8%	.0%

(Continued)

Table 83 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ALS Design	.6	.0	.6	0	.4%	.0%	1.2%	.0%
Vamp	.5	.0	.5	0	.3%	.0%	1.1%	.0%
Number One Systems	.5	.1	.4	34	.3%	.1%	.8%	.2%
Andor	.4	.1	.2	3	.2%	.1%	.5%	.0%
Digital	.3	.0	.2	0	.2%	.0%	.4%	.0%
Omaton	.3	.0	.3	0	.2%	.0%	.6%	.0%
Compact Software	.3	.0	.3	0	.2%	.0%	.5%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.2%	.0%	.5%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.4%	.0%
Pacific Numerics	.2	.0	.2	0	.1%	.0%	.4%	.0%
American Small Business Comp.	.2	.0	.2	0	.1%	.0%	.3%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.2%	.0%
Olivetti	.1	.1	.0	17	.1%	.1%	.0%	.1%
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Masta Corporation	.1	.0	.0	0	.0%	.0%	.1%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	149.3	89.4	48.9	17,210	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	103.1	65.0	30.2	14,549	69.1%	72.7%	61.8%	84.5%
All Asian-Based Companies	18.0	12.8	3.6	1,681	12.1%	14.3%	7.4%	9.8%
All European-Based Companies	28.2	11.6	15.0	981	18.9%	12.9%	30.7%	5.7%
All Hardware Companies	72.0	67.4	.0	14,946	48.2%	75.5%	.0%	86.8%
All Turnkey & SW Companies	77.3	21.9	48.9	2,265	51.8%	24.5%	100.0%	13.2%

Source: Dataquest (September 1992)

Table 84
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	62.5	41.2	2.2	584	17.5%	21.3%	2.4%	4.0%
Sun Microsystems	54.0	46.5	.0	3,523	15.1%	24.1%	.0%	24.0%
Mentor Graphics	51.3	16.2	17.7	494	14.4%	8.4%	19.7%	3.4%
Valid	30.2	1.5	21.2	205	8.5%	.8%	23.5%	1.4%
Intergraph	24.2	9.1	7.0	287	6.8%	4.7%	7.7%	2.0%
Hewlett-Packard	17.8	14.6	.0	2,257	5.0%	7.6%	.0%	15.4%
Compaq	14.8	14.8	.0	2,883	4.1%	7.7%	.0%	19.7%
IBM	12.2	7.5	2.6	676	3.4%	3.9%	2.9%	4.6%
Harris EDA	9.9	1.3	5.4	48	2.8%	.7%	6.0%	.3%
Apple Computer	5.7	5.1	.0	1,203	1.6%	2.6%	.0%	8.2%
Zuken	4.2	1.7	2.5	24	1.2%	.9%	2.8%	.2%
Computervision	4.1	1.4	1.4	46	1.1%	.7%	1.5%	.3%
Racal-Redac	3.9	.0	3.3	0	1.1%	.0%	3.7%	.0%
CADAM	3.8	.9	2.5	180	1.1%	.5%	2.7%	1.2%
PADS Software	3.7	.0	3.2	0	1.0%	.0%	3.5%	.0%
Pacific Numerics	3.6	.0	3.6	0	1.0%	.0%	3.9%	.0%
Autodesk	2.4	.0	2.4	0	.7%	.0%	2.7%	.0%
Cadence	2.4	.0	1.5	0	.7%	.0%	1.7%	.0%
Solbourne	2.2	2.2	.0	198	.6%	1.1%	.0%	1.4%
Visionics	1.8	.0	1.3	7	.5%	.0%	1.5%	.0%
Accel Technologies	1.7	.0	1.6	0	.5%	.0%	1.7%	.0%
Infinite Graphics	1.7	.0	1.7	0	.5%	.0%	1.9%	.0%
LPKF	1.5	1.0	.4	65	.4%	.5%	.4%	.4%
Dell Computer	1.4	1.4	.0	360	.4%	.7%	.0%	2.5%

(Continued)

Table 84 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Everex Systems	1.4	1.4	.0	556	.4%	.7%	.0%	3.8%
Massteck	1.2	.0	1.2	0	.3%	.0%	1.4%	.0%
Ontos	1.2	.0	1.2	0	.3%	.0%	1.3%	.0%
BETRONEX	1.2	.1	1.0	22	.3%	.1%	1.2%	.1%
Orcad	1.1	.0	1.1	0	.3%	.0%	1.2%	.0%
Cadisys	1.0	.0	1.0	0	.3%	.0%	1.1%	.0%
Royal Digital Systems	.8	.0	.7	0	.2%	.0%	.8%	.0%
Vamp	.4	.0	.4	0	.1%	.0%	.5%	.0%
Compact Software	.3	.0	.3	0	.1%	.0%	.3%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.3%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.3%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.1%	.0%	.3%	.0%
Shared Resources	.2	.0	.2	0	.1%	.0%	.2%	.0%
Omaton	.2	.0	.2	0	.0%	.0%	.2%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.2%	.0%
Cooper & Chyan Technology	.1	.0	.1	0	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.1%	.0%
Number One Systems	.0	.0	.0	2	.0%	.0%	.0%	.0%

(Continued)

Table 84 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	26.3	25.0	.0	1,034	7.4%	13.0%	.0%	7.1%
All Companies	357.4	192.8	89.9	14,653	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	346.6	190.0	82.7	14,541	97.0%	98.6%	91.9%	99.2%
All Asian-Based Companies	4.2	1.7	2.5	24	1.2%	.9%	2.8%	.2%
All European-Based Companies	6.6	1.1	4.7	88	1.8%	.6%	5.3%	.6%
All Hardware Companies	186.3	155.0	.0	13,288	52.1%	80.4%	.0%	90.7%
All Turnkey & SW Companies	171.1	37.8	89.9	1,365	47.9%	19.6%	100.0%	9.3%

Source: Dataquest (September 1992)

Table 85
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	51.3	16.2	17.7	494	24.4%	17.6%	26.2%	8.1%
Sun Microsystems	48.6	42.1	.0	3,263	23.1%	45.9%	.0%	53.5%
Valid	30.2	1.5	21.2	205	14.4%	1.6%	31.3%	3.4%
Intergraph	21.6	7.9	6.4	251	10.3%	8.6%	9.4%	4.1%
Digital	12.9	7.5	1.6	458	6.1%	8.1%	2.4%	7.5%
Hewlett-Packard	12.8	10.7	.0	1,121	6.1%	11.6%	.0%	18.4%
Harris EDA	9.4	1.2	5.1	44	4.4%	1.3%	7.5%	.7%
Zuken	4.2	1.7	2.5	24	2.0%	1.8%	3.7%	.4%
Computervision	4.1	1.4	1.4	46	1.9%	1.6%	2.0%	.8%
Racal-Redac	3.7	.0	3.1	0	1.8%	.0%	4.5%	.0%
Pacific Numerics	3.4	.0	3.4	0	1.6%	.0%	5.0%	.0%
Cadence	2.2	.0	1.4	0	1.0%	.0%	2.1%	.0%
IBM	1.6	.9	.4	48	.8%	1.0%	.6%	.8%
Ontos	1.2	.0	1.2	0	.6%	.0%	1.8%	.0%
Royal Digital Systems	.8	.0	.7	0	.4%	.0%	1.1%	.0%
Solbourne	.6	.6	.0	121	.3%	.7%	.0%	2.0%
Infinite Graphics	.3	.0	.3	0	.2%	.0%	.5%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.4%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.4%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.3%	.0%
Shared Resources	.2	.0	.2	0	.1%	.0%	.3%	.0%
Everex Systems	.2	.2	.0	25	.1%	.2%	.0%	.4%
Compact Software	.1	.0	.1	0	.1%	.0%	.2%	.0%
Cooper & Chyan Technology	.1	.0	.1	0	.1%	.0%	.2%	.0%

(Continued)

Table 85 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadsiys	.1	.0	.1	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	210.4	91.8	67.6	6,101	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	202.6	90.1	62.0	6,076	96.3%	98.2%	91.8%	99.6%
All Asian-Based Companies	4.2	1.7	2.5	24	2.0%	1.8%	3.7%	.4%
All European-Based Companies	3.7	.0	3.1	0	1.8%	.0%	4.5%	.0%
All Hardware Companies	73.0	61.0	.0	4,988	34.7%	66.5%	.0%	81.8%
All Turnkey & SW Companies	137.4	30.8	67.6	1,113	65.3%	33.5%	100.0%	18.2%

Source: Dataquest (September 1992)

Table 86

1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	33.8	22.9	.4	0	48.6%	43.6%	12.2%	.0%
IBM	8.2	4.4	2.2	115	11.8%	8.4%	67.7%	10.0%
Harris EDA	.5	.1	.4	4	.7%	.2%	11.9%	.3%
Intergraph	.4	.2	.1	5	.6%	.4%	2.2%	.5%
Cadence	.2	.0	.1	0	.3%	.0%	3.8%	.0%
Compact Software	.1	.0	.1	0	.1%	.0%	2.2%	.0%
Other Companies	26.3	25.0	.0	1,034	37.9%	47.5%	.0%	89.2%
All Companies	69.4	52.7	3.2	1,158	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	69.4	52.7	3.2	1,158	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	59.6	47.9	.0	1,034	85.8%	91.0%	.0%	89.2%
All Turnkey & SW Companies	9.8	4.7	3.2	125	14.2%	9.0%	100.0%	10.8%

Source: Dataquest (September 1992)

Table 87
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	15.6	10.8	.0	126	60.9%	58.4%	.0%	22.9%
Sun Microsystems	5.4	4.4	.0	260	21.1%	23.9%	.0%	47.4%
Intergraph	2.1	1.0	.5	30	8.2%	5.5%	87.9%	5.5%
Solbourne	1.6	1.6	.0	78	6.2%	8.5%	.0%	14.2%
Hewlett-Packard	.6	.5	.0	44	2.2%	2.5%	.0%	7.9%
IBM	.3	.2	.1	12	1.3%	1.1%	12.1%	2.1%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	25.6	18.4	.6	549	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	25.6	18.4	.6	549	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	23.2	17.3	.0	518	90.6%	93.5%	.0%	94.2%
All Turnkey & SW Companies	2.4	1.2	.6	32	9.4%	6.5%	100.0%	5.8%

Source: Dataquest (September 1992)

Table 88
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
Platform: Personal Computer
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Market Share											
	Total			Hardware			Total			Hardware		
	Factory Revenue	Hardware Revenue	Software Revenue	Shipped	Units	Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Shipped	Units	Revenue
Compaq	14.8	14.8	.0	2,883		28.4%	49.4%	.0%			42.1%	
Apple Computer	5.7	5.1	.0	1,203		11.0%	16.9%	.0%			17.6%	
Hewlett-Packard	4.4	3.5	.0	1,093		8.4%	11.7%	.0%			16.0%	
CADAM	3.8	.9	2.5	180		7.3%	3.0%	13.3%			2.6%	
PADS Software	3.7	.0	3.2	0		7.2%	.0%	17.1%			.0%	
Autodesk	2.2	.0	2.2	0		4.3%	.0%	11.9%			.0%	
IBM	2.1	2.0	.0	501		4.1%	6.7%	.0%			7.3%	
Vislonics	1.8	.0	1.3	7		3.4%	.0%	7.2%			.1%	
Accel Technologies	1.7	.0	1.6	0		3.3%	.0%	8.4%			.0%	
LPKF	1.5	1.0	.4	65		2.9%	3.2%	2.0%			.9%	
Dell Computer	1.4	1.4	.0	360		2.7%	4.7%	.0%			5.3%	
Infinite Graphics	1.3	.0	1.3	0		2.6%	.0%	7.2%			.0%	
Masstock	1.2	.0	1.2	0		2.4%	.0%	6.7%			.0%	
Everex Systems	1.2	1.2	.0	531		2.3%	4.0%	.0%			7.8%	
BETRONEX	1.2	.1	1.0	22		2.2%	.4%	5.6%			.3%	
Orcad	1.1	.0	1.1	0		2.1%	.0%	5.8%			.0%	
Cadisy	.9	.0	.9	0		1.7%	.0%	4.8%			.0%	
Vamp	.4	.0	.4	0		.8%	.0%	2.2%			.0%	
Racal-Redac	.2	.0	.2	0		.5%	.0%	1.3%			.0%	
The Great Softwestern Co.	.2	.0	.2	0		.4%	.0%	1.2%			.0%	
Digital	.2	.0	.2	0		.4%	.0%	.9%			.0%	
Pacific Numerics	.2	.0	.2	0		.3%	.0%	1.0%			.0%	
Ormaton	.2	.0	.2	0		.3%	.0%	.9%			.0%	
American Small Business Comp.	.2	.0	.2	0		.3%	.0%	.8%			.0%	
(Continued)												

(Continued)

Table 88 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Innovative Data Design	.1	.0	.1	0	.2%	.0%	.6%	.0%
Compact Software	.1	.0	.1	0	.2%	.0%	.5%	.0%
Poresight Resources	.1	.0	.1	0	.1%	.0%	.4%	.0%
Number One Systems	.0	.0	.0	2	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	52.0	29.9	18.6	6,845	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	49.1	28.8	16.9	6,757	94.4%	96.4%	90.9%	98.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.9	1.1	1.7	88	5.6%	3.6%	9.1%	1.3%
All Hardware Companies	30.5	28.8	.0	6,750	58.7%	96.3%	.0%	98.6%
All Turnkey & SW Companies	21.5	1.1	18.6	96	41.3%	3.7%	100.0%	1.4%

Source: Dataquest (September 1992)

Table 89
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	49.7	33.9	.0	498	15.9%	22.3%	.0%	4.3%
Mentor Graphics	31.0	6.5	12.7	298	9.9%	4.3%	14.9%	2.6%
Sun Microsystems	28.9	24.8	.0	1,482	9.2%	16.4%	.0%	12.7%
Racal-Redac	27.3	.0	23.0	0	8.7%	.0%	26.8%	.0%
Hewlett-Packard	25.9	17.1	.0	2,720	8.3%	11.3%	.0%	23.3%
Intergraph	23.6	4.6	8.0	224	7.5%	3.0%	9.3%	1.9%
IBM	23.5	14.0	5.2	1,154	7.5%	9.2%	6.1%	9.9%
Compaq	14.8	14.8	.0	2,883	4.7%	9.8%	.0%	24.7%
Valid	12.0	.4	7.7	23	3.8%	.3%	9.0%	.2%
LPKF	12.0	7.8	3.0	520	3.8%	5.1%	3.5%	4.5%
Computervision	11.0	4.1	2.6	83	3.5%	2.7%	3.0%	.7%
Harris EDA	9.8	.8	5.7	51	3.1%	.5%	6.7%	.4%
Siemens Nixdorf Info systeme	6.7	3.2	2.4	99	2.2%	2.1%	2.8%	.8%
CADAM	2.5	.6	1.6	120	.8%	.4%	1.9%	1.0%
Apple Computer	2.4	2.1	.0	504	.8%	1.4%	.0%	4.3%
BETRONEX	2.1	.2	1.8	39	.7%	.1%	2.2%	.3%
CAD-LJL	2.1	.0	2.1	0	.7%	.0%	2.4%	.0%
Ziegler Informatics	1.9	.0	1.9	0	.6%	.0%	2.3%	.0%
PADS Software	1.8	.0	1.5	0	.6%	.0%	1.8%	.0%
Orcad	1.5	.0	1.5	0	.5%	.0%	1.7%	.0%
DECAD	1.3	.2	.8	5	.4%	.1%	.9%	.0%
Research Machines	1.2	1.2	.0	194	.4%	.8%	.0%	1.7%
Zuken	.8	.3	.5	5	.3%	.2%	.6%	.0%
Dell Computer	.8	.8	.0	194	.2%	.5%	.0%	1.7%

(Continued)

Table 89 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Solbourne	.7	.6	.0	65	.2%	.4%	.0%	.6%
ICL	.7	.4	.2	19	.2%	.3%	.3%	.2%
Cadence	.7	.0	.5	0	.2%	.0%	.5%	.0%
ALS Design	.7	.0	.7	0	.2%	.0%	.8%	.0%
Massteck	.4	.0	.4	0	.1%	.0%	.5%	.0%
Number One Systems	.4	.1	.3	30	.1%	.1%	.4%	.3%
Pacific Numerics	.4	.0	.4	0	.1%	.0%	.5%	.0%
Accel Technologies	.3	.0	.3	0	.1%	.0%	.3%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.2%	.0%
Compact Software	.2	.0	.2	0	.1%	.0%	.2%	.0%
Everex Systems	.2	.2	.0	64	.1%	.1%	.0%	.5%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.1%
Omaton	.1	.0	.1	0	.0%	.0%	.1%	.0%
Vamp	.1	.0	.1	0	.0%	.0%	.1%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.1%	.0%
Masta Corporation	.1	.0	.0	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.0%	.0%	.0%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 89 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	13.6	12.8	.0	386	4.3%	8.5%	.0%	3.3%
All Companies	313.5	151.6	85.5	11,676	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	255.8	138.0	48.6	10,749	81.6%	91.1%	56.8%	92.1%
All Asian-Based Companies	.8	.3	.5	5	.3%	.2%	.6%	.0%
All European-Based Companies	56.8	13.2	36.4	922	18.1%	8.7%	42.6%	7.9%
All Hardware Companies	143.6	113.6	.0	10,203	45.8%	75.0%	.0%	87.4%
All Turnkey & SW Companies	169.9	37.9	85.5	1,472	54.2%	25.0%	100.0%	12.6%

Source: Dataquest (September 1992)

Table 90
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	31.0	6.5	12.7	298	17.4%	10.8%	20.1%	7.2%
Sun Microsystems	26.0	22.5	.0	1,412	14.5%	37.1%	.0%	34.2%
Racal-Redac	25.7	.0	21.3	0	14.4%	.0%	33.6%	.0%
Intergraph	22.1	3.9	7.7	204	12.4%	6.5%	12.1%	4.9%
Hewlett-Packard	18.0	10.8	.0	1,422	10.1%	17.9%	.0%	34.4%
Valid	12.0	.4	7.7	23	6.7%	.6%	12.1%	.6%
Computervision	11.0	4.1	2.6	83	6.2%	6.8%	4.1%	2.0%
Harris EDA	9.8	.8	5.7	51	5.5%	1.3%	9.0%	1.2%
Digital	9.0	5.8	.0	391	5.0%	9.5%	.0%	9.5%
Siemens Nixdorf Info systems	6.7	3.2	2.4	99	3.8%	5.4%	3.7%	2.4%
IBM	3.2	1.5	.8	75	1.8%	2.4%	1.3%	1.8%
DECAD	1.3	.2	.8	4	.7%	.3%	1.2%	.1%
Zuken	.8	.3	.5	5	.5%	.5%	.8%	.1%
ICL	.7	.4	.2	19	.4%	.7%	.4%	.5%
Cadence	.6	.0	.4	0	.3%	.0%	.7%	.0%
Pacific Numerics	.4	.0	.4	0	.2%	.0%	.6%	.0%
Solbourne	.2	.1	.0	39	.1%	.2%	.0%	1.0%
ALS Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Compact Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.1%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.1%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	3	.0%	.0%	.0%	.1%
Cooper & Chyan Technology	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 90 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	178.7	60.5	63.4	4,128	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	143.4	56.3	38.2	4,001	80.3%	93.1%	60.2%	96.9%
All Asian-Based Companies	.8	.3	.5	5	.5%	.5%	.8%	.1%
All European-Based Companies	34.4	3.9	24.7	122	19.3%	6.4%	39.0%	3.0%
All Hardware Companies	53.1	39.2	.0	3,267	29.7%	64.8%	.0%	79.1%
All Turnkey & SW Companies	125.6	21.3	63.4	861	70.3%	35.2%	100.0%	20.9%

Source: Dataquest (September 1992)

Table 91
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	27.7	19.1	.0	0	47.0%	45.6%	.0%	.0%
IBM	16.1	8.7	4.3	193	27.3%	20.7%	97.7%	24.8%
Intergraph	.3	.1	.0	3	.4%	.3%	.5%	.4%
Cadence	.1	.0	.0	0	.1%	.0%	.7%	.0%
Compact Software	.0	.0	.0	0	.1%	.0%	.9%	.0%
DECAD	.0	.0	.0	1	.1%	.0%	.2%	.1%
Other Companies	14.8	14.0	.0	580	25.1%	33.4%	.0%	74.7%
All Companies	58.9	41.9	4.4	777	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	58.9	41.9	4.4	776	99.9%	100.0%	99.8%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	1	.1%	.0%	.2%	.1%
All Hardware Companies	42.5	33.1	.0	580	72.1%	79.0%	.0%	74.7%
All Turnkey & SW Companies	16.5	8.8	4.4	197	27.9%	21.0%	100.0%	25.3%

Source: Dataquest (September 1992)

Table 92

1991 CAD/CAM/CAR/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	13.0	9.0	.0	107	68.9%	67.6%	.0%	38.0%
Sun Microsystems	2.9	2.4	.0	69	15.3%	17.7%	.0%	24.5%
Intergraph	1.2	.6	.3	17	6.5%	4.5%	65.9%	6.0%
IBM	.7	.4	.2	20	3.5%	3.1%	34.1%	7.1%
Hewlett-Packard	.6	.5	.0	44	3.1%	3.4%	.0%	15.4%
Solbourne	.5	.5	.0	25	2.7%	3.7%	.0%	9.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	18.9	13.3	.4	282	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	18.9	13.3	.4	282	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	17.1	12.3	.0	263	90.4%	92.9%	.0%	93.2%
All Turnkey & SW Companies	1.8	.9	.4	19	9.6%	7.1%	100.0%	6.8%

Source: Dataquest (September 1992)

Table 93
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	14.8	14.8	.0	2,883	25.9%	41.2%	.0%	44.4%
LPKF	12.0	7.8	3.0	520	21.1%	21.8%	17.3%	8.0%
Hewlett-Packard	7.3	5.8	.0	1,254	12.8%	16.3%	.0%	19.3%
IBM	3.6	3.5	.0	867	6.4%	9.7%	.0%	13.4%
CADAM	2.5	.6	1.6	120	4.4%	1.7%	9.4%	1.8%
Apple Computer	2.4	2.1	.0	504	4.2%	5.9%	.0%	7.8%
BETRONEX	2.1	.2	1.8	39	3.6%	.6%	10.6%	.6%
CAD-UL	2.1	.0	2.1	0	3.6%	.0%	11.9%	.0%
Ziegler Informatics	1.9	.0	1.9	0	3.4%	.0%	11.2%	.0%
PADS Software	1.8	.0	1.5	0	3.1%	.0%	8.8%	.0%
Racal-Redac	1.7	.0	1.7	0	2.9%	.0%	9.5%	.0%
Orcad	1.5	.0	1.5	0	2.6%	.0%	8.6%	.0%
Research Machines	1.2	1.2	.0	194	2.1%	3.3%	.0%	3.0%
Dell Computer	.8	.8	.0	194	1.3%	2.1%	.0%	3.0%
ALS Design	.6	.0	.6	0	1.0%	.0%	3.4%	.0%
Massteck	.4	.0	.4	0	.8%	.0%	2.5%	.0%
Number One Systems	.4	.1	.3	30	.7%	.2%	1.8%	.5%
Accel Technologies	.3	.0	.3	0	.6%	.0%	1.7%	.0%
Instrumatic Espanola	.2	.0	.2	0	.4%	.0%	1.2%	.0%
Everex Systems	.1	.1	.0	61	.2%	.4%	.0%	.9%
Olivetti	.1	.1	.0	17	.2%	.2%	.0%	.3%
Ormaton	.1	.0	.1	0	.2%	.0%	.5%	.0%
Vamp	.1	.0	.1	0	.1%	.0%	.5%	.0%
Masta Corporation	.1	.0	.0	0	.1%	.0%	.2%	.0%

(Continued)

Table 93 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compact Software	.1	.0	.1	0	.1%	.0%	.3%	.0%
Robocom	.0	.0	.0	0	.1%	.0%	.2%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.1%	.0%
Pacific Numerics	.0	.0	.0	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	57.0	35.9	17.3	6,489	100.0%	100.0%	100.0%	100.0%
 All N.A.-Based Companies	 34.7	 26.5	 5.6	 5,689	 60.8%	 73.9%	 32.5%	 87.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	22.3	9.4	11.7	799	39.2%	26.1%	67.5%	12.3%
All Hardware Companies	31.0	29.0	.0	6,094	54.3%	80.8%	.0%	93.9%
All Turnkey & SW Companies	26.1	6.9	17.3	395	45.7%	19.2%	100.0%	6.1%

Source: Dataquest (September 1992)

Table 94
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zuken	78.3	31.3	47.0	457	19.5%	15.0%	31.1%	5.0%
Uchida Yoko	36.8	34.9	1.8	584	9.2%	16.8%	1.2%	6.4%
Sharp System Products—NO OEM	31.2	16.2	15.0	186	7.8%	7.8%	9.9%	2.0%
Fujitsu	31.0	19.5	8.4	698	7.7%	9.4%	5.5%	7.7%
Sun Microsystems	28.2	24.3	.0	1,563	7.0%	11.7%	.0%	17.3%
Mentor Graphics	24.6	7.1	9.1	236	6.1%	3.4%	6.0%	2.6%
CADIX	22.6	9.0	11.3	166	5.6%	4.3%	7.5%	1.8%
Racal-Redac	20.6	.0	15.8	0	5.1%	.0%	10.5%	.0%
NEC	20.6	14.1	4.8	1,703	5.1%	6.8%	3.2%	18.8%
IBM	15.4	9.1	3.5	686	3.8%	4.4%	2.3%	7.6%
Digital	11.9	7.8	.5	109	3.0%	3.7%	.4%	1.2%
Toshiba—NO OEM	11.6	5.8	4.6	131	2.9%	2.8%	3.1%	1.4%
Hewlett-Packard	9.4	7.7	.0	974	2.3%	3.7%	.0%	10.7%
Hitachi	9.0	4.3	3.8	264	2.2%	2.1%	2.5%	2.9%
Valid	7.9	.0	6.5	0	2.0%	.0%	4.3%	.0%
CADAM	6.7	1.5	4.4	300	1.7%	.7%	2.9%	3.3%
Intergraph	6.4	1.6	2.3	55	1.6%	.7%	1.5%	.6%
Harris EDA	4.9	.7	2.7	24	1.2%	.3%	1.8%	.3%
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.6%	.4%	.8%	.1%
Computervision	2.2	.9	1.0	21	.6%	.4%	.6%	.2%
PADS Software	2.0	.0	1.7	0	.5%	.0%	1.1%	.0%
Sumitomo Denko Workstation	1.8	1.8	.0	100	.4%	.9%	.0%	1.1%
Cadence	1.6	.0	1.6	0	.4%	.0%	1.1%	.0%
Century Research Center	1.4	.7	.5	8	.3%	.4%	.3%	.1%

(Continued)

Table 94 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
LPKF	1.4	.9	.3	59	.3%	.4%	.2%	.6%
Apple Computer	1.0	.9	.0	213	.3%	.4%	.0%	2.4%
Sony	1.0	.9	.0	58	.2%	.4%	.0%	.6%
Compaq	1.0	1.0	.0	188	.2%	.5%	.0%	2.1%
BETRONEX	.9	.1	.8	17	.2%	.0%	.6%	.2%
Cooper & Chyan Technology	.7	.0	.7	0	.2%	.0%	.4%	.0%
Seiko Instruments—NO OEM	.6	.3	.3	4	.2%	.1%	.2%	.0%
Andor	.4	.1	.2	3	.1%	.0%	.2%	.0%
Autodesk	.3	.0	.3	0	.1%	.0%	.2%	.0%
Solbourne	.3	.3	.0	23	.1%	.1%	.0%	.3%
Accel Technologies	.2	.0	.2	0	.1%	.0%	.1%	.0%
Compact Software	.2	.0	.2	0	.0%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.1	.0	.0	3	.0%	.0%	.0%	.0%
Everex Systems	.1	.0	.0	19	.0%	.0%	.0%	.2%
Massteck	.1	.0	.1	0	.0%	.0%	.0%	.0%
Vamp	.0	.0	.0	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Oration	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 94 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	5.1	4.8	.0	199	1.3%	2.3%	.0%	2.2%
All Companies	401.8	208.4	150.9	9,061	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	130.3	67.6	35.0	4,610	32.4%	32.4%	23.2%	50.9%
All Asian-Based Companies	248.6	139.9	98.9	4,375	61.9%	67.1%	65.6%	48.3%
All European-Based Companies	22.8	1.0	17.0	76	5.7%	.5%	11.3%	.8%
All Hardware Companies	62.4	52.8	.0	4,218	15.5%	25.3%	.0%	46.6%
All Turnkey & SW Companies	339.4	155.7	150.9	4,843	84.5%	74.7%	100.0%	53.4%

Source: Dataquest (September 1992)

Table 95

1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zuken	78.3	31.3	47.0	457	24.7%	20.1%	36.3%	9.4%
Uchida Yoko	36.8	34.9	1.8	584	11.6%	22.4%	1.4%	12.0%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	8.6%	9.0%	10.0%	3.4%
Sun Microsystems	25.4	22.0	.0	1,475	8.0%	14.1%	.0%	30.2%
Mentor Graphics	24.6	7.1	9.1	236	7.8%	4.6%	7.0%	4.8%
CADIX	22.6	9.0	11.3	166	7.1%	5.8%	8.7%	3.4%
Racal-Redac	20.6	.0	15.8	0	6.5%	.0%	12.2%	.0%
Fujitsu	12.7	8.0	3.4	308	4.0%	5.1%	2.6%	6.3%
Toshiba—NO OEM	11.6	5.8	4.6	131	3.6%	3.7%	3.6%	2.7%
NEC	10.9	6.0	4.0	341	3.4%	3.8%	3.1%	7.0%
Valid	7.9	.0	6.5	0	2.5%	.0%	5.0%	.0%
Hewlett-Packard	6.5	5.4	.0	505	2.0%	3.5%	.0%	10.3%
Intergraph	6.2	1.5	2.3	50	1.9%	.9%	1.8%	1.0%
Harris EDA	4.7	.6	2.5	22	1.5%	.4%	1.9%	.5%
Hitachi	4.5	2.2	1.9	89	1.4%	1.4%	1.5%	1.8%
Digital	2.6	1.4	.4	85	.8%	.9%	.3%	1.7%
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.8%	.5%	.9%	.2%
Computervision	2.2	.9	1.0	21	.7%	.6%	.8%	.4%
IBM	2.1	1.2	.5	59	.7%	.8%	.4%	1.2%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.5%	1.1%	.0%	1.8%
Cadence	1.5	.0	1.5	0	.5%	.0%	1.2%	.0%
Century Research Center	1.4	.7	.5	8	.4%	.5%	.4%	.2%
Sony	1.0	.9	.0	58	.3%	.6%	.0%	1.2%
Cooper & Chyan Technology	.7	.0	.7	0	.2%	.0%	.5%	.0%

(Continued)

Table 95 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Seiko Instruments—NO OEM	.6	.3	.3	4	.2%	.2%	.2%	.1%
Solbourne	.1	.1	.0	14	.0%	.0%	.0%	.3%
Compact Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Autodesk	.0	.0	.0	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	2	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	1	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	316.8	155.9	129.6	4,885	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	84.6	40.2	24.6	2,469	26.7%	25.8%	19.0%	50.5%
All Asian-Based Companies	211.6	115.7	89.1	2,416	66.8%	74.2%	68.8%	49.5%
All European-Based Companies	20.6	.0	15.8	0	6.5%	.0%	12.2%	.0%
All Hardware Companies	36.6	31.4	.0	2,228	11.6%	20.1%	.0%	45.6%
All Turnkey & SW Companies	280.1	124.5	129.6	2,657	88.4%	79.9%	100.0%	54.4%

Source: Dataquest (September 1992)

Table 96
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	13.3	8.4	3.6	225	35.5%	34.8%	47.6%	37.2%
IBM	10.9	5.9	2.9	153	29.0%	24.3%	38.3%	25.3%
Digital	6.3	4.3	.1	0	16.9%	17.9%	1.3%	.0%
Hitachi	1.4	.7	.6	24	3.8%	2.8%	7.9%	4.0%
Harris EDA	.3	.1	.2	2	.7%	.2%	2.5%	.3%
Cadence	.1	.0	.1	0	.3%	.0%	1.7%	.0%
Intergraph	.0	.0	.0	1	.1%	.1%	.1%	.1%
Compact Software	.0	.0	.0	0	.1%	.0%	.5%	.0%
Kubota Computer	.0	.0	.0	1	.1%	.0%	.0%	.1%
Other Companies	5.1	4.8	.0	199	13.5%	19.9%	.0%	33.0%
All Companies	37.6	24.2	7.6	605	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	22.8	15.1	3.4	355	60.6%	62.4%	44.5%	58.7%
All Asian-Based Companies	14.8	9.1	4.2	250	39.4%	37.6%	55.5%	41.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	11.3	9.1	.0	199	30.0%	37.8%	.0%	33.0%
All Turnkey & SW Companies	26.3	15.0	7.6	405	70.0%	62.2%	100.0%	67.0%

Source: Dataquest (September 1992)

Table 97
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sharp System Products—NO OEM	4.1	2.1	1.9	18	37.0%	29.1%	93.7%	10.1%
Digital	2.9	2.0	.0	23	26.8%	28.0%	.0%	13.2%
Sun Microsystems	2.8	2.3	.0	88	25.8%	32.0%	.0%	49.6%
IBM	.4	.2	.1	11	3.9%	3.3%	4.3%	6.4%
Intergraph	.2	.1	.0	4	2.0%	1.1%	1.9%	2.2%
Solbourne	.2	.2	.0	9	1.6%	2.5%	.0%	5.0%
Hewlett-Packard	.2	.1	.0	13	1.6%	1.9%	.0%	7.6%
Sumitomo Denko Workstation	.1	.1	.0	11	1.3%	1.9%	.0%	6.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	11.0	7.2	2.1	178	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	6.8	5.0	.1	149	61.7%	68.9%	6.3%	83.9%
All Asian-Based Companies	4.2	2.2	1.9	29	38.3%	31.1%	93.7%	16.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	6.3	4.8	.0	154	57.4%	66.9%	.0%	86.7%
All Turnkey & SW Companies	4.7	2.4	2.1	24	42.6%	33.1%	100.0%	13.3%

Source: Dataquest (September 1992)

Table 98
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
NEC	9.7	8.1	.8	1,362	26.5%	38.3%	6.6%	40.1%
CADAM	6.7	1.5	4.4	300	18.3%	7.1%	38.0%	8.8%
Fujitsu	5.0	3.1	1.3	165	13.6%	14.8%	11.5%	4.9%
Hitachi	3.1	1.5	1.3	151	8.4%	6.9%	11.1%	4.5%
Hewlett-Packard	2.8	2.2	.0	455	7.6%	10.3%	.0%	13.4%
PADS Software	2.0	.0	1.7	0	5.6%	.0%	14.8%	.0%
IBM	2.0	1.8	.0	462	5.3%	8.7%	.0%	13.6%
LPKF	1.4	.9	.3	59	3.7%	4.2%	2.9%	1.7%
Apple Computer	1.0	.9	.0	213	2.8%	4.2%	.0%	6.3%
Compaq	1.0	1.0	.0	188	2.6%	4.5%	.0%	5.5%
BETRONEX	.9	.1	.8	17	2.5%	.4%	7.1%	.5%
Andor	.4	.1	.2	3	1.0%	.4%	2.1%	.1%
Autodesk	.3	.0	.3	0	.8%	.0%	2.7%	.0%
Accel Technologies	.2	.0	.2	0	.6%	.0%	1.6%	.0%
Digital	.1	.0	.0	0	.2%	.0%	.3%	.0%
Compact Software	.1	.0	.1	0	.2%	.0%	.5%	.0%
Massteck	.1	.0	.1	0	.1%	.0%	.4%	.0%
Everex Systems	.0	.0	.0	18	.1%	.2%	.0%	.5%
Vamp	.0	.0	.0	0	.1%	.0%	.3%	.0%
Ormaton	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 98 (Continued)
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	36.5	21.2	11.6	3,394	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	16.2	7.4	6.8	1,637	44.4%	35.0%	58.7%	48.2%
All Asian-Based Companies	18.0	12.8	3.6	1,681	49.4%	60.4%	31.3%	49.5%
All European-Based Companies	2.3	1.0	1.2	76	6.2%	4.6%	10.1%	2.2%
All Hardware Companies	8.3	7.4	.0	1,637	22.6%	35.0%	.0%	48.2%
All Turnkey & SW Companies	28.3	13.8	11.6	1,757	77.4%	65.0%	100.0%	51.8%

Source: Dataquest (September 1992)

Table 99

1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	3.7	2.6	.0	37	27.8%	27.0%	.0%	4.6%
Compaq	1.6	1.6	.0	313	12.0%	17.0%	.0%	39.6%
Sun Microsystems	1.1	1.0	.0	72	8.2%	10.0%	.0%	9.1%
IBM	.9	.6	.1	105	6.4%	6.7%	5.5%	13.3%
Hewlett-Packard	.8	.7	.0	106	6.1%	7.0%	.0%	13.4%
Orcad	.5	.0	.5	0	4.0%	.0%	26.4%	.0%
BETRONEX	.5	.1	.4	9	3.4%	.5%	20.4%	1.1%
Zuken	.4	.2	.3	2	3.1%	1.8%	12.4%	.3%
Intergraph	.3	.1	.1	4	1.9%	1.3%	2.5%	.5%
PADS Software	.2	.0	.2	0	1.7%	.0%	10.0%	.0%
Computervision	.2	.1	.1	2	1.3%	.7%	2.5%	.2%
LPKF	.2	.1	.0	7	1.1%	1.1%	2.0%	.8%
Royal Digital Systems	.1	.0	.1	0	1.0%	.0%	6.0%	.0%
Apple Computer	.1	.1	.0	19	.7%	.8%	.0%	2.4%
Compact Software	.1	.0	.1	0	.6%	.0%	4.0%	.0%
Massteck	.1	.0	.1	0	.4%	.0%	2.5%	.0%
Accel Technologies	.1	.0	.0	0	.4%	.0%	2.0%	.0%
Number One Systems	.0	.0	.0	2	.2%	.1%	1.5%	.3%
Autodesk	.0	.0	.0	0	.2%	.0%	1.5%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.1%	.0%	.5%	.0%
Ziegler Informatics	.0	.0	.0	0	.1%	.0%	.5%	.0%

(Continued)

Table 99 (Continued)

1991 CAD/CAM/CAE/EDA Final Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	2.6	2.5	.0	114	19.3%	26.0%	.0%	14.4%
All Companies	13.4	9.5	2.0	792	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	12.3	9.1	1.3	772	92.0%	96.5%	63.2%	97.5%
All Asian-Based Companies	.4	.2	.3	2	3.1%	1.8%	12.4%	.3%
All European-Based Companies	.7	.2	.5	17	4.9%	1.7%	24.4%	2.2%
All Hardware Companies	10.3	8.7	.0	759	77.3%	92.1%	.0%	95.9%
All Turnkey & SW Companies	3.0	.8	2.0	33	22.7%	7.9%	100.0%	4.1%

Source: Dataquest (September 1992)

Table 100

1991 CAD/CAM/CAE/CIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun Microsystems	1.0	.9	.0	67	29.7%	38.7%	.0%	37.1%
Digital	.7	.5	.0	29	20.1%	20.7%	.0%	16.0%
Hewlett-Packard	.6	.5	.0	66	18.9%	23.0%	.0%	37.0%
Zuken	.4	.2	.3	2	12.6%	7.7%	48.1%	1.4%
Intergraph	.2	.1	.0	3	6.0%	5.0%	7.7%	1.7%
Computervision	.2	.1	.1	2	5.4%	3.2%	9.6%	1.1%
Royal Digital Systems	.1	.0	.1	0	3.9%	.0%	23.1%	.0%
IBM	.1	.0	.0	2	2.1%	1.8%	3.8%	1.2%
Compact Software	.0	.0	.0	0	.9%	.0%	5.8%	.0%
Cooper & Chyan Technology	.0	.0	.0	0	.3%	.0%	1.9%	.0%
Other Companies	.0	.0	.0	8	.0%	.0%	.0%	4.5%
All Companies	3.3	2.2	.5	179	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.9	2.1	.3	177	87.4%	92.3%	51.9%	98.6%
All Asian-Based Companies	.4	.2	.3	2	12.6%	7.7%	48.1%	1.4%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.3	1.8	.0	170	68.8%	82.4%	.0%	94.6%
All Turnkey & SW Companies	1.0	.4	.5	10	31.2%	17.6%	100.0%	5.4%

Source: Dataquest (September 1992)

Table 101
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	2.1	1.4	.0	0	41.3%	35.1%	.0%	.0%
IBM	.4	.2	.1	5	6.9%	4.4%	81.8%	4.7%
Compact Software	.0	.0	.0	0	.4%	.0%	18.2%	.0%
Intergraph	.0	.0	.0	0	.2%	.0%	.0%	.1%
Other Companies	2.6	2.5	.0	101	51.2%	60.4%	.0%	95.2%
All Companies	5.0	4.1	.1	106	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.0	4.1	.1	106	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.7	3.9	.0	101	92.5%	95.6%	.0%	95.2%
All Turnkey & SW Companies	.4	.2	.1	5	7.5%	4.4%	100.0%	4.8%

Source: Dataquest (September 1992)

Table 102
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
Platform: Server
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.0	.7	.0	8	82.2%	81.7%	.0%	33.8%
Sun Microsystems	.1	.1	.0	5	9.3%	11.0%	.0%	22.8%
Hewlett-Packard	.0	.0	.0	3	3.4%	3.7%	.0%	13.4%
Intergraph	.0	.0	.0	1	3.4%	1.2%	100.0%	2.2%
IBM	.0	.0	.0	2	1.7%	2.4%	.0%	8.7%
Other Companies	.0	.0	.0	4	.0%	.0%	.0%	19.0%
All Companies	1.2	.8	.0	23	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.2	.8	.0	23	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.1	.8	.0	23	95.8%	97.6%	.0%	97.5%
All Turnkey & SW Companies	.1	.0	.0	1	4.2%	2.4%	100.0%	2.5%

Source: Dataquest (September 1992)

Table 103
1991 CAD/CAM/CAE/GIS Final Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	1.6	1.6	.0	313	42.0%	68.2%	.0%	64.9%
Orcad	.5	.0	.5	0	13.8%	.0%	38.7%	.0%
BETRONEX	.5	.1	.4	9	12.0%	2.1%	29.9%	1.8%
IBM	.4	.4	.0	96	10.7%	16.5%	.0%	19.9%
PADS Software	.2	.0	.2	0	6.0%	.0%	14.6%	.0%
Hewlett-Packard	.2	.1	.0	36	3.9%	5.1%	.0%	7.5%
LPKF	.2	.1	.0	7	3.9%	4.2%	2.9%	1.3%
Apple Computer	.1	.1	.0	19	2.3%	3.4%	.0%	4.0%
Massteck	.1	.0	.1	0	1.3%	.0%	3.6%	.0%
Accel Technologies	.1	.0	.0	0	1.3%	.0%	2.9%	.0%
Compact Software	.0	.0	.0	0	.8%	.0%	2.2%	.0%
Number One Systems	.0	.0	.0	2	.8%	.4%	2.2%	.5%
Autodesk	.0	.0	.0	0	.8%	.0%	2.2%	.0%
Ziegler Informatics	.0	.0	.0	0	.3%	.0%	.7%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3.8	2.4	1.4	483	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.2	2.2	.9	465	83.0%	93.2%	64.2%	96.4%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.7	.2	.5	17	17.0%	6.8%	35.8%	3.6%
All Hardware Companies	2.3	2.2	.0	465	59.0%	93.2%	.0%	96.4%
All Turnkey & SW Companies	1.6	.2	1.4	17	41.0%	6.8%	100.0%	3.6%

Source: Dataquest (September 1992)

Dataquest

Dataquest Research and Sales Offices:

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
United States
Phone: 01-408-437-8000
Facsimile: 01-408-437-0292

Dataquest Incorporated
Dataquest/Ledgeway
550 Cochituate Road
Framingham, Massachusetts 01701-9324
United States
Phone: 01-508-370-5555
Facsimile: 01-508-370-6262

Dataquest Incorporated Invitational
Computer Conferences Division
3151 Airway Avenue, C-2
Costa Mesa, California 92626
United States
Phone: 01-714-957-0171
Facsimile: 01-714-957-0903

Dataquest Australia
Suite 1, Century Plaza
80 Berry Street
North Sydney, NSW 2060
Australia
Phone: 61-2-959-4544
Facsimile: 61-2-929-0635

Dataquest Europe Limited
Roussel House, Broadwater Park
Denham, Uxbridge
Middlesex UB9 5HP
England
Phone: 44-895-835050
Facsimile: 44-895-835260/1

Dataquest Europe SA
Tour Gallieni 2
36, avenue du Général-de-Gaulle
93175 Bagnolet Cedex
France
Phone: 33-1-48-97-3100
Facsimile: 33-1-48-97-3400

Dataquest GmbH
Kronstadter Strasse 9
8000 Munich 80
Germany
Phone: 49-89-930-9090
Facsimile: 49-89-930-3277

Dataquest Germany
In der Schneithohl 17
6242 Kronberg 2
Germany
Phone: 49-6173/61685
Facsimile: 49-6173/67901

Dataquest Hong Kong
Rm. 4A01
HKPC Building
78 Tat Chee Avenue
Kowloon, Hong Kong
Phone: 852-788-5432
Facsimile: 852-788-5433

Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa, Chuo-ku
Tokyo, 104
Japan
Phone: 81-3-5566-0411
Facsimile: 81-3-5566-0425

Dataquest Korea
Daeheung Building 1105
648-23 Yeoksam-dong
Kangnam-gu
Seoul 135-080, Korea
Phone: 82-2-556-4166
Facsimile: 82-2-552-2661

Dataquest Singapore
4012 Ang Mo Kio Industrial Park 1
Ave. 10, #03-10 to #03-12
Singapore 2056
Phone: 65-4597181
Telex: 38257
Facsimile: 65-4563129

Dataquest Taiwan
Room 801/8th Floor
Ever Spring Building
147, Sec. 2, Chien Kuo N. Rd.
Taipei, Taiwan R.O.C. 104
Phone: 886-2-501-7960
886-2-501-5592
Facsimile: 886-2-505-4265

Dataquest Thailand
300/31 Rachdapisek Road
Bangkok 10310
Thailand
Phone: 66-2-275-1904/5
66-2-277-8850
Facsimile: 66-2-275-7005

**EDA Applications
Preliminary Forecast
May 18, 1992**

**Survey
Dataquest**

Market Statistics

**CAD/CAM/CAE
Electronic Design Automation Applications**

CCAM-EDA-MS-9201

EDA Applications
Preliminary Forecast
May 18, 1992

Source:
Dataquest

Market Statistics

Dataquest®

File behind the *Market Statistics* tab inside the
binder labeled *CAD/CAM/CAE—Electronic*
Design Automation Applications

Published by Dataquest Incorporated

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May 1992

EDA Applications Preliminary Forecast

May 18, 1992

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EDA Applications Preliminary Forecast

Introduction

The slowing of world economies was a major factor affecting CAD/CAM/CAE growth in 1991 and will continue to affect growth over the next few years. Many of the major world economies faltered in 1991 to 1992. On a list of the 33 largest countries compiled earlier this year by the Economic Analysis Department of The Dun & Bradstreet Corporation, 18 were in or near recession. Although the gross domestic product/gross national product (GDP/GNP) forecast for 1992 to 1993 has been adjusted upward for the United States, the GDP/GNP forecast for 1992 to 1993 for 7 of the 14 European economies tracked has been adjusted downward. The Japanese economy, which has traditionally exhibited steady growth when other major economies slowed, began to falter in the latter half of 1991. Forecasts call for R&D spending in Japan to slow to less than 10 percent (for the first time in 10 years) and for Japanese domestic spending to decline in the second half of 1992.

In spite of these poor economic conditions, the CAD/CAM/CAE market posted solid growth of 9.5 percent to \$15.8 billion in 1991, somewhat slower than the growth rates of previous years. The market is forecast to grow at a compound annual growth rate (CAGR) of 9 percent through 1996 (see Figure 1). (This forecast is based on the CAD/CAM/CAE group's preliminary market information and will be updated in October).

This document contains Dataquest's detailed forecast information on the CAD/CAM/CAE industry. Included in this document are the following:

- Five-year historical data
- Five-year forecast data

More detailed data on this market may be requested through our client inquiry service.

Forecast Accuracy and Comparison

Overall, last year's CAD/CAM/CAE market forecast appears to have been slightly optimistic in many cases, with some variance among regions (see Table 1).

European growth in 1991 was slightly less than expected because of slower growth in all countries except Benelux. Overall, the European economy slowed considerably during 1991. The North American results for 1991 were somewhat better than expected. Asia was right on target. By application, AEC results were slightly better than expected for 1991; while actual results were somewhat lower than expected in the other application areas. Figure 2 shows the CAD/CAM/CAE forecast by application.

Forecast Assumptions

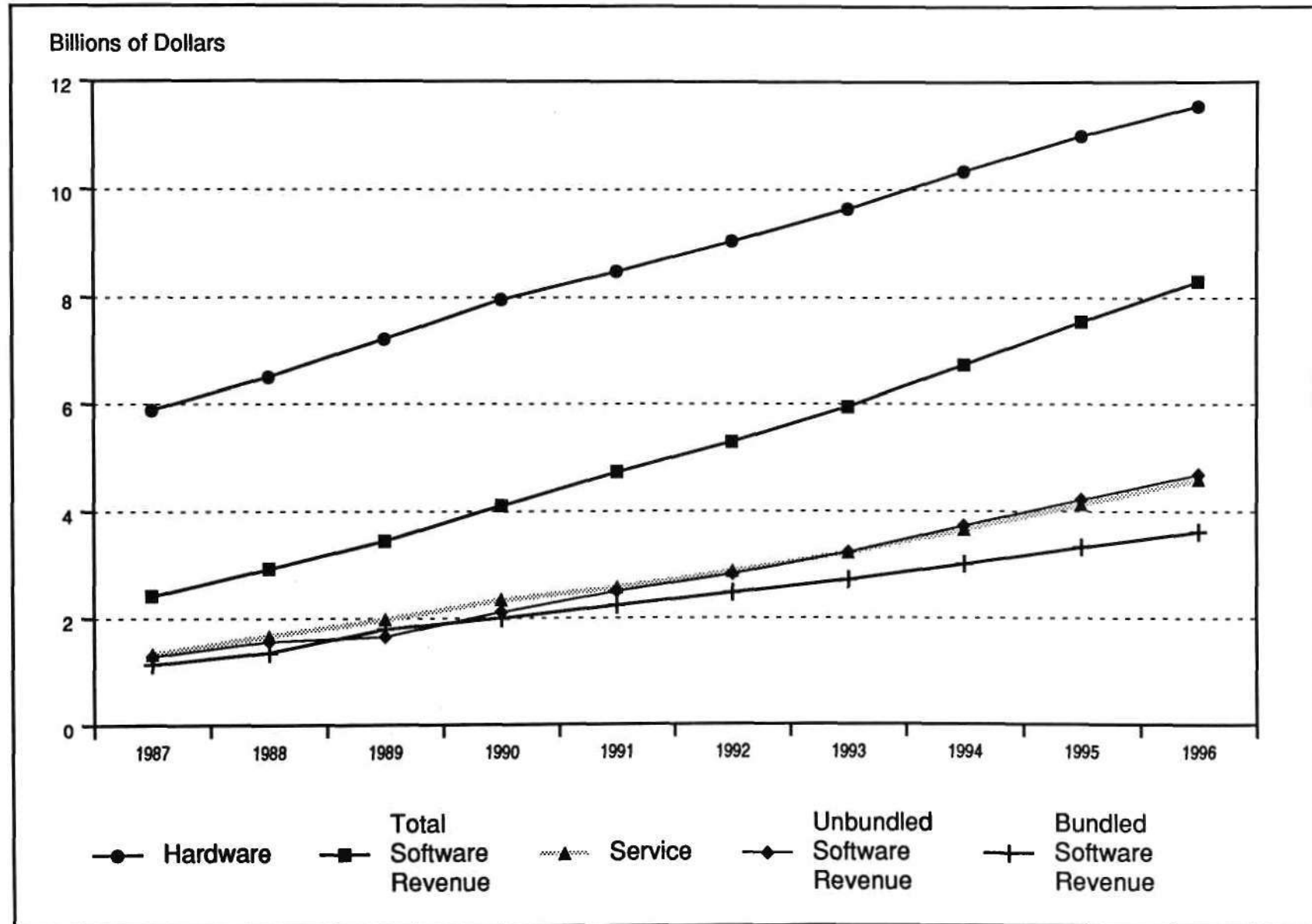
Below are the main forces by region, driving the CAD/CAM/CAE forecast.

Worldwide Forecast Drivers

The following are the main forces driving the CAD/CAM/CAE worldwide forecast:

- CAD/CAM/CAE systems will continue to give buyers a competitive edge. As time-to-market requirements shrink, demand for design automation tools will continue to increase.
- Limited system budget growth in the near term will constrain growth. Budgets for hardware, software, and services are forecast to grow by 5 to 10 percent in North America in 1992, 10 to 15 percent in Europe, and approximately 15 percent in Asia. Dataquest's research indicates that users do not plan to buy one core software

Figure 1
History and Forecast for the CAD/CAM/CAE Market: Hardware, Software, and Service



Source: Dataquest (May 1992)

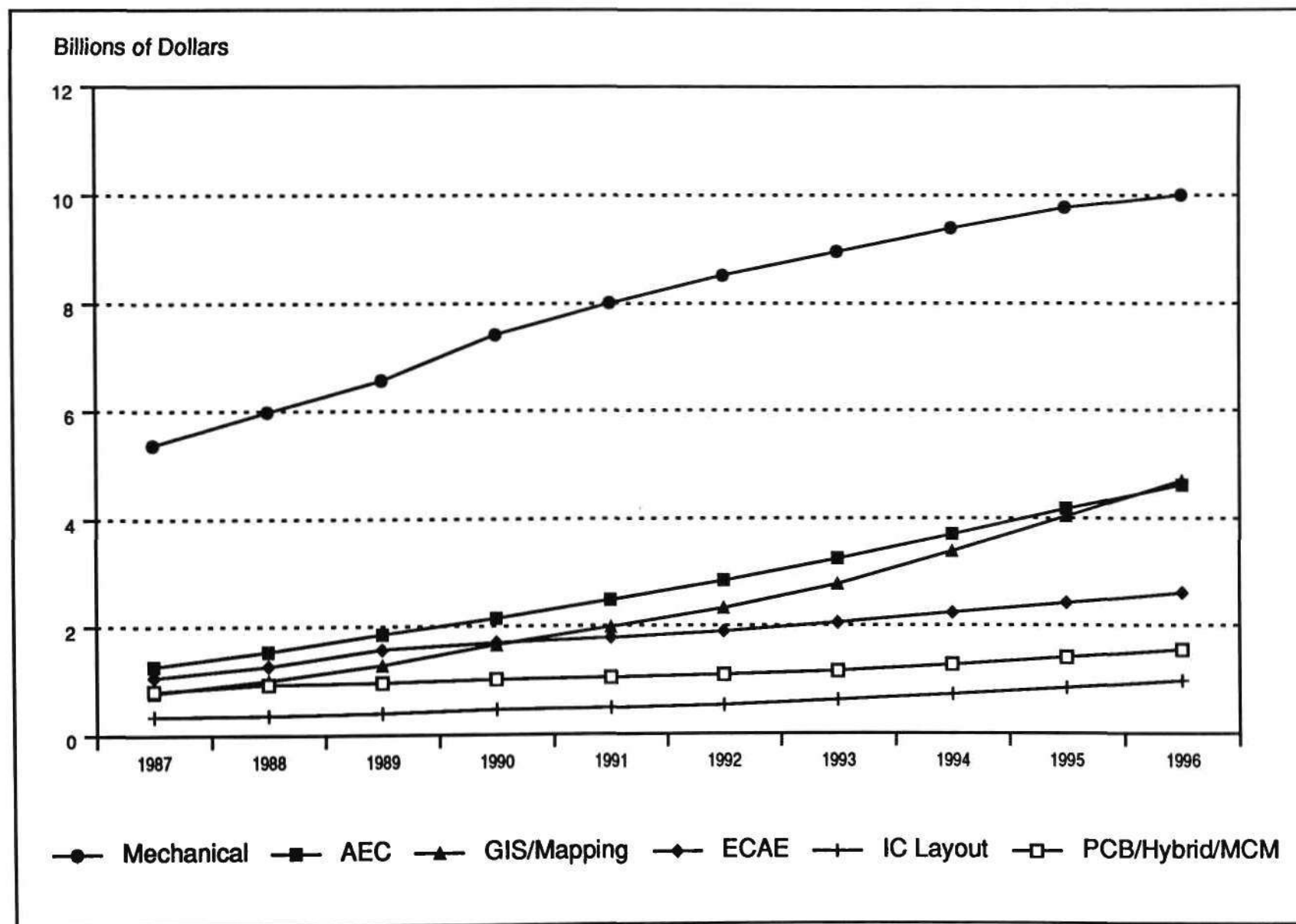
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Table 1
CAD/CAM/CAE Forecast Comparison (Billions of Dollars)

	1991	1992	CAGR (%) 1991-1996
Worldwide			
Last Year's Forecast	16.0	17.9	12
Actual Results and Current Forecast	15.8	17.2	9
Difference (%)	-1.5	-4.2	
North America			
Last Year's Forecast	5.2	5.7	9
Actual Results and Current Forecast	5.3	5.7	7
Difference (%)	2.4	0.5	
Europe			
Last Year's Forecast	6.0	6.8	13
Actual Results and Current Forecast	5.7	6.2	10
Difference (%)	-4.9	-7.9	
Asia			
Last Year's Forecast	4.5	5.1	12
Actual Results and Current Forecast	4.4	4.9	9
Difference (%)	-0.8	-3.6	
Rest of World			
Last Year's Forecast	0.4	0.5	21
Actual Results and Current Forecast	0.3	0.4	16
Difference (%)	-9.6	-14.3	

Source: Dataquest (May 1992)

Figure 2
History and Forecast for the CAD/CAM/CAE Market by Application



Source: Dataquest (May 1992)

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package for each person; the sharing of seats will continue. Networked users will continue to buy systems for a limited number of concurrent users, waiting until the system overloads before buying more.

- Market demand will be limited by the vendors' inability to fully meet demand for highly integrated software systems. Dataquest believes that the industry business model is evolving to a structure where large software vendors will function increasingly as application software integrators. Much of the innovation in new niche products can be expected to come from the small software vendors, which will be dependent on their OEM relationships with "major" software vendors. These alliances will ultimately reduce the total cost of software development, thus strengthening industry profitability. However, design problems will become increasingly complex, and meaningful success in integrating software will lag behind market demand.
- We anticipate incremental progress in delivering open systems and standards to market, which will constrain market demand. When and how open systems successfully arrive on the market will affect the value of CAD tools.
- The "late majority" buyers for CAD/CAM/CAE will be coming to market over the next five years, driving additional growth. However, conservative buyers will favor market leaders. These conservative buyers are the "late majority" buyers who do not buy until the weight of the majority seems to legitimize the product. Therefore, for vendors, the value of having high market share as well as financial clout will increase.
- Market growth will be limited until the second half of 1992 for the EDA market. The major EDA vendors have just introduced their new products. Currently, many EDA buyers are evaluating product options and refraining from purchasing until a thorough evaluation is completed.

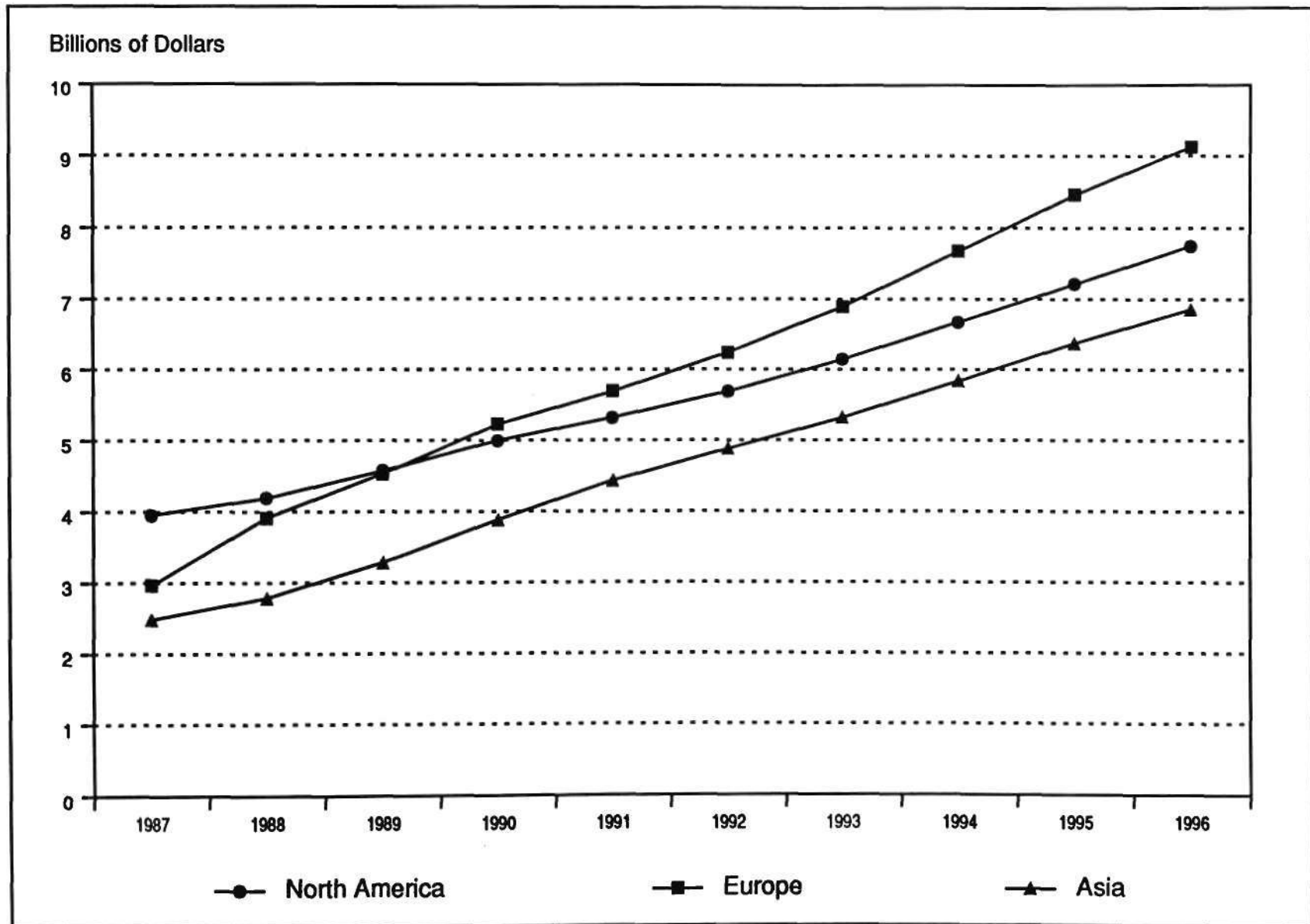
North American Forecast Drivers

The North American market grew 6 percent in 1991 to \$5.3 billion and is forecast to grow at an 8 percent CAGR through 1996 (see Figure 3 for the forecast by region).

Some of the main factors driving the North American forecast are the following:

- Market growth will increase in the second half of 1992. In an across-the-board resurgence of optimism, U.S. business executives have said they expect higher sales and profits in the second quarter, according to The Dun & Bradstreet Corporation's latest nationwide quarterly survey of business executives. "Rebounding sharply from nearly a nine-year low last quarter, the mood of business executives around the nation has grown much more optimistic," said Joseph W. Duncan, vice president and chief economist for The Dun & Bradstreet Corporation. "The turnaround was unequivocal, with virtually all industries and nearly every region of the country expecting stronger sales and profits next quarter."
- Market growth will be reduced because of decreasing average selling prices (ASPs). The United States is a large market with more developed distribution channels and larger order sizes than other markets. Streamlined distribution channels leave fewer places for profit to hide; and, therefore, ASPs have declined more sharply. In contrast, the European market is the sum of many markets of smaller countries, each with its own customs and requirements. Because of these special requirements, ASPs have not been as pressured to decline in European markets as they have been in the U.S. market. Therefore, North American unit shipments will continue to grow significantly, while revenue will grow at a slower rate because of strong price competition.
- Market growth will be limited because of lower defense spending. Spending cuts in the defense budget of 25 to 30 percent over the next five years are currently being proposed by the U.S. administration. In the United States, both republicans and democrats are seeking to balance defense spending cuts against the large loss of jobs that is expected to occur when such reductions are made. Most likely, the defense department will encourage continued growth in R&D spending, while severely limiting the number of programs that would lead to actual production. CAD companies that are heavily dependent on direct or indirect government defense spending contracts will have increasingly limited growth opportunities.

Figure 3
History and Forecast for the CAD/CAM/CAE Market by Region



Source: Dataquest (May 1992)

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European Forecast Drivers

The European market will reach \$9.1 billion by 1996 and grew 9 percent in 1991 to \$5.7 billion. This market is forecast to have a revenue CAGR of 10 percent through 1996. Some of the main issues driving the European forecast include the following:

- Growth will steadily increase in Eastern Europe. The collapse of the Soviet Union as an export market has complicated the difficult situation already facing other central and eastern European countries as they make the transition to market economies and establish new international trading arrangements. Poland, Hungary, and, more recently, Czechoslovakia have made impressive progress in shifting exports to other markets. In all these countries, prices have been set free and inflation seems to be coming under control. The initial groundwork has been laid. GDP/GNP growth is forecast to turn positive during 1992 to 1993 and reach strength toward 1994. As these countries' economies become market economies, CAD/CAM/CAE opportunities will increase.
- Growth will be relatively unaffected by the advent of the European Community (EC). The effects of 1992 will be evolutionary, not revolutionary. Currently, the new EC regulations on environment (such as request for environmental impact studies for town planning) are driving considerable growth in the GIS application area.
- Growth is expected for European vendors as they expand into other European markets. To date, many European vendors have competed only in their country of origin. Over the next forecast period, European vendors will increasingly expand their overseas operations to become more competitive across the European community. German companies and German subsidiaries of international companies are increasingly expanding into Eastern European countries.

Asian Forecast Drivers

The Asian market grew 14 percent in 1991 to \$4.4 billion, and its forecast CAGR for revenue is 9 percent through 1996. Some of

the main issues driving the Asian forecast are as follows:

- Shifting labor costs will affect growth among countries. Labor costs in Japan, Korea, Taiwan, and Hong Kong will continue to increase, which will result in a growing demand for productivity tools including CAD/CAM/CAE. Industries with blue-collar workers will transfer operations to Indonesia, Malaysia, the Philippines, Thailand, and the Republic of China; Japan, Korea, Taiwan, and Hong Kong will grow based on the industry of the white-collar workers. Remote design and manufacturing sites also will encourage the growth of electronic data sharing and thus CAD/CAM across Asia.
- Growth will be strong as companies continue transitioning from the mainframe to network-based desktop environments. CAD/CAM/CAE in Japan is still predominantly a mainframe environment. As companies increase their interest in desktop systems, healthy unit growth will occur, and ASPs should decline sharply.
- Growth will be strong in EDA. Demands for merchant EDA tools supporting the design of ASICs, MCMs, and application-specific standard products (ASSPs) will expand; the development of in-house electronic products will continue to decline. The EDA industry will continue moving toward an oligopoly of vendors providing a full line of tools encapsulated within an open framework, with niche vendors providing point-solution tools.
- Growth is less likely in some Asian countries because of the lack of stringent intellectual property rights. Most Asian countries, with the exception of Japan, have few laws governing intellectual property rights. Many companies will be hesitant to invest or set up operations in a region where they will receive no design protection.
- Mechanical CAD/CAM/CAE growth will continue to be strong in Asia because of growing requirements to support concurrent engineering. Point-solution tools associated with parametric and variational design, manufacturability, and testability will be required. Major vendors will add these tools through OEMs, merger and acquisitions, or

in-house development in order to defend their installed base.

Notes on Forecast

For the 1991 publishing cycle, Dataquest's CAD/CAM/CAE group added server as a platform. The platform categories now include technical workstation, host-dependent, server, and personal computer. Revenue formerly classified in technical workstations, host-dependent, or personal computer may now be more accurately classified, where appropriate, in the server category. However, because of this reclassification, data and growth rates for the other platform areas were affected. Figure 4 depicts the revised platform distribution.

Forecast Methodology

Fundamental to the way Dataquest conducts its research is an underlying philosophy that says the best data and analyses come from a well-balanced program. This program includes balance between primary and secondary collection techniques; balance between supply-side and demand-side analysis; balance between focused, industry-specific research and coordinated, "big-picture" analysis aided by integration of data from the more than 25 separate high-technology industries Dataquest covers; and balance between the perspectives of experienced industry professionals and rigorous, disciplined techniques of seasoned market researchers.

Dataquest also analyzes trends in the macro-environment, which can have major influences on both supply-side and demand-side forecasting. In addition to demographics, analysts look at GNP growth, interest rate fluctuation, currency fluctuation, business expectations, and capital spending plans. In the geopolitical arena, the group looks at trade issues, political stability or lack thereof, tariffs, nontariff barriers, and such factors as the effect on Europe of the events of 1992.

Figure 5 is a pictorial summary of the information compendium offered by the Dataquest CAD/CAM/CAE group.

The CAD/CAM/CAE industry market estimates and forecasts are derived using the following research techniques:

- "Bottom-up" aggregation—This method involves adding all relevant vendor contributions to arrive at total market estimates for all historical data.
- Segment forecasting—For each application segment tracked by the CAD/CAM/CAE group, individual forecasts are derived following the basic information model defined previously. Specifically, each design phase covered within each application is segmented by channel, product, region, and platform. In this way, each application segment incorporates its own set of unique assumptions.
- Demand-based analysis—Market growth is tracked and forecast in terms of the present and anticipated demand of current and future users. This requires the development of a total available market (TAM) model and a satisfied available market figure to accurately assess the levels of penetration. Installed base is also evaluated. Rates of product retirement are primarily based on input from end users in our ongoing survey programs. Figure 6 shows the CAD/CAM/CAE installed base by platform. In addition, Dataquest analysts factor in the acceptance or ability for users to consume new technology.
- Capacity-based analysis—This method involves identifying future shipment volume constraints. These constraints, or "ceilings," can be the result of component availability, manufacturing capacity, or distribution capacity. In any case, capacity limitations are capable of keeping shipments below the demand level.

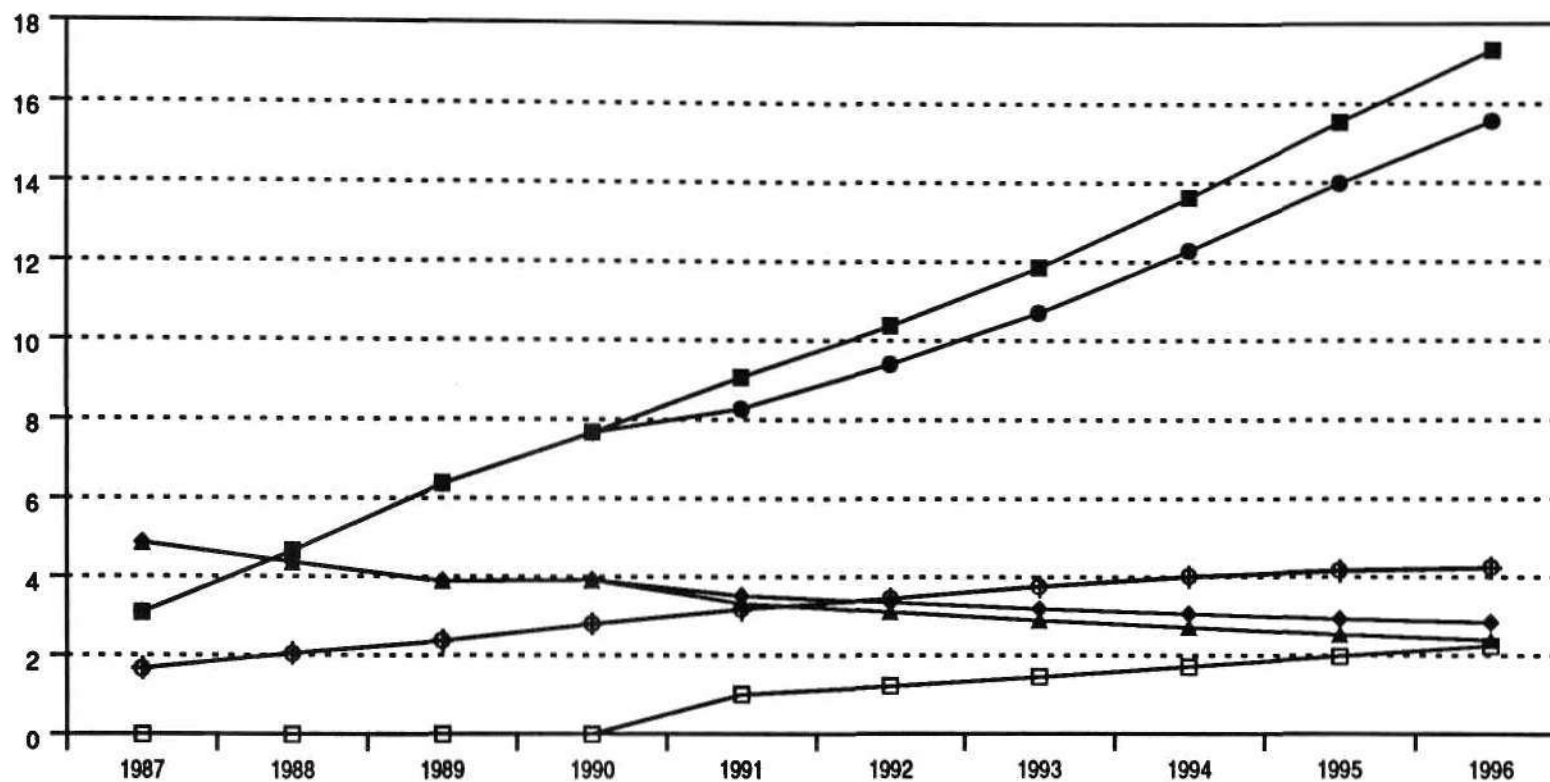
Segmentation

For complete information on Dataquest's high-technology market segmentation scheme, please refer to the *Dataquest High-Technology Guide: Segmentation and Glossary*.

Dataquest defines CAD/CAM/CAE as systems used in the mechanical; architecture, engineering, and construction (AEC); GIS/mapping; and electronic design automation (EDA) application

Figure 4
CAD/CAM/CAE Revised Platform Distribution

Billions of Dollars

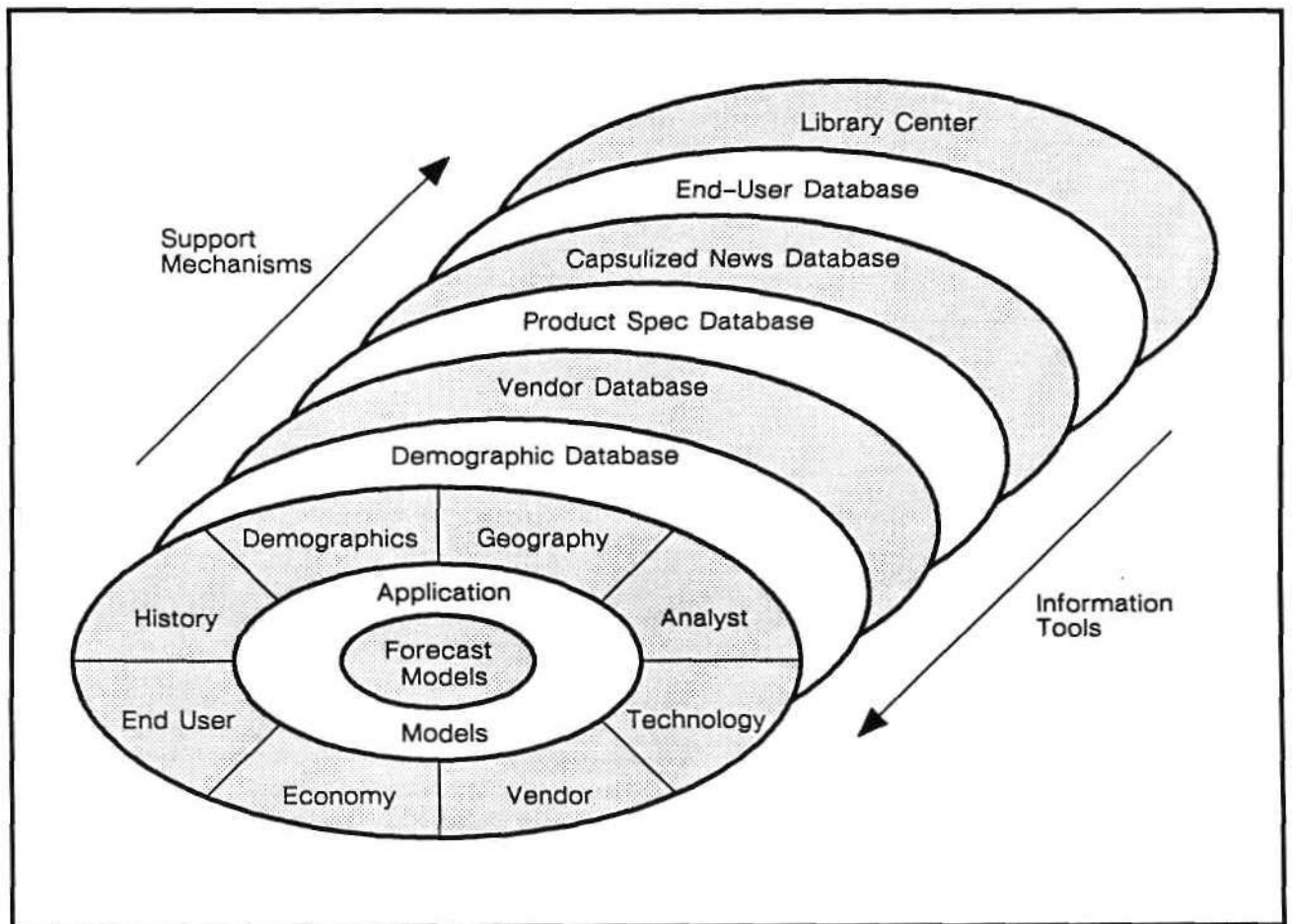


● New Technical Workstation
 ■ Old Technical Workstation
 ▲ New Host-Dependent
 ◆ Old Host-Dependent
 + New PC
 ○ Old PC
 □ Server

Source: Dataquest (May 1992)

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Figure 5
Information Compendium



Source: Dataquest (May 1992)

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areas. The CAD/CAM/CAE market is defined according to the following segmentation scheme:

- CAD/CAM/CAE
 - Mechanical
 - AEC (Architecture, Engineering, and Construction)
 - GIS/Mapping (Geographic Information Systems)
 - EDA (Electronic Design Automation)
 - Electronic CAE
 - IC Layout
 - PCB/Hybrid/MCM

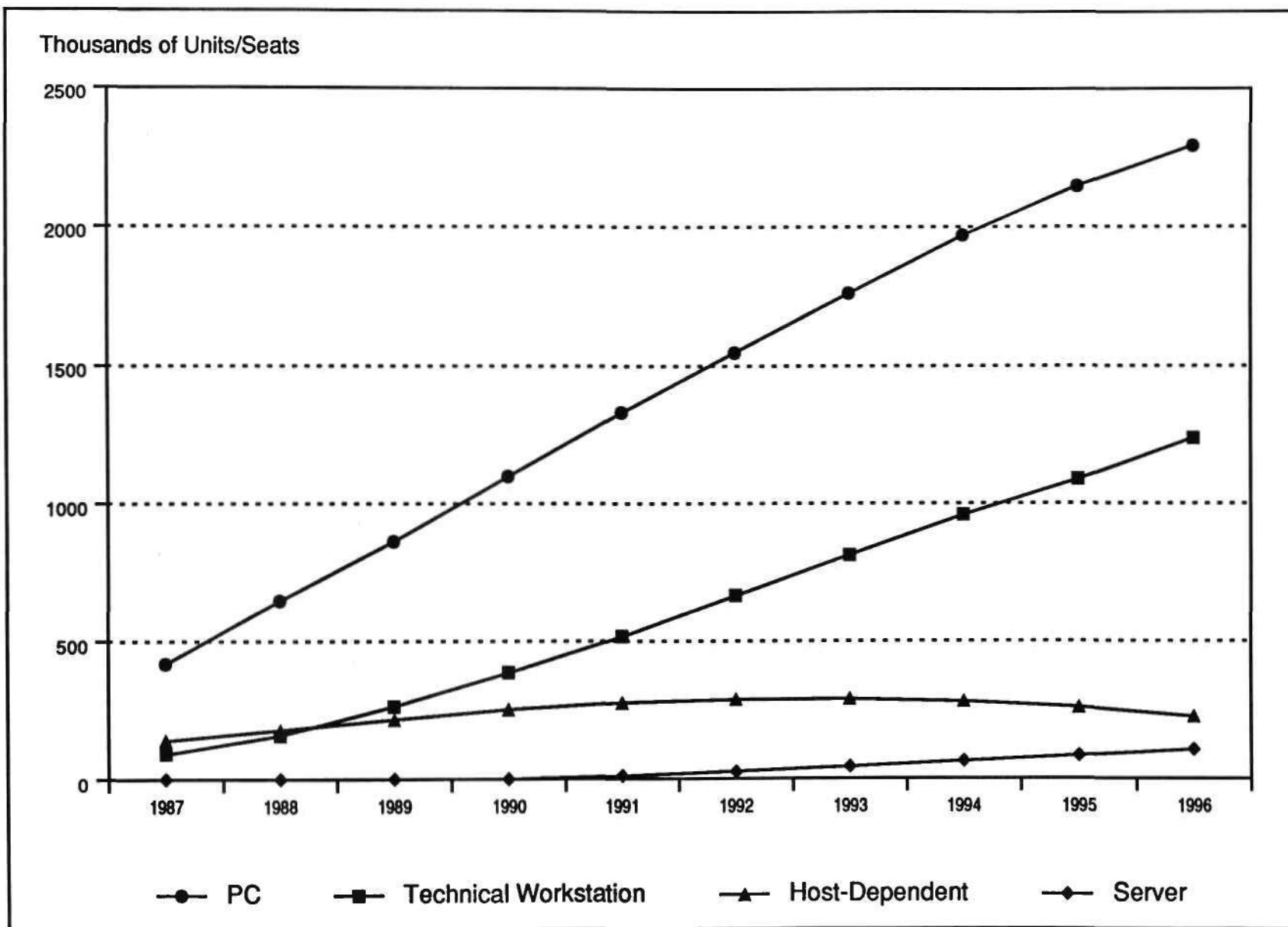
In addition, more detailed information by subapplication is available and usually published in *Dataquest Perspectives*.

For a listing of possible subapplication categories, see the *Dataquest High-Technology Guide: Segmentation and Glossary*.

Definitions

This section lists the definitions that are specific to this document. Complete definitions for all terms can be found in the *Dataquest High-Technology Guide: Segmentation and Glossary*.

Figure 6
CAD/CAM/CAE Installed Base



Source: Dataquest (May 1992)

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Application definitions are as follows:

- **Mechanical**—Mechanical CAD/CAM refers to computer-aided tools used to design, analyze, document, and manufacture discrete parts, components, and assemblies.
- **Architecture, Engineering, and Construction (AEC)**—This segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.
- **Geographic Information Systems (GIS)/Mapping**—This is a computer-based technology, composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.
- **Electronic Design Automation (EDA)**—This segment covers computer-based tools that are used to automate the process of designing an electronic product including printed circuit boards, ICs, and systems. EDA includes ECAE, IC Layout, and PCB/Hybrid/MCM, as follows:
 - **Electronic Computer-Aided Engineering (CAE)**—These are computer-aided tools used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of Electronic CAE applications are schematic capture and simulation.
 - **IC Layout**—This is a software application tool that is used to create and validate the physical implementation of an integrated circuit (IC). The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
 - **Printed Circuit Board (PCB)/Hybrid/Multichip Module (MCM)**—This segment covers products that are used to create the placement and routing of the traces and components laid out on a printed circuit board. Also, included in this category are thermal analysis tools.

Regional definitions are as follows:

- **North America**—Includes United States and Canada
- **Europe**—Includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe
- **Asia**—Includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong
- **Rest of World**—All other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East

Platform definitions are as follows:

- **Technical Workstation**—This is a single-user computer that is distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, DOMAIN); the computer is designed by manufacturer to run high-performance graphic applications in a multiuser/multitasking environment.
- **Host-Dependent**—This is a shared logic system in which the external workstations' functions are dependent on a host computer.
- **Server**—A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, compute capability, and others. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:
 - **Compute Servers**—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
 - **Print Servers**—These systems provide access to printers, specialized printing applications software, and print-spooling resources to a network.

- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
 - Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.
 - Personal Computer—This is defined as a single-user computer that is distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.
- Line item definitions are as follows:
- Average selling price (ASP) is defined as the average price of a product, inclusive of any discounts.
 - CPU installed base is defined as the total number of CPUs in active, day-to-day use.
 - CPU revenue is the portion of revenue derived from a system sale that is related to the value of the CPU. (In the case of technical workstations and personal computers, CPU revenue contains the terminal revenue.)
 - CPU shipment is defined as the number of CPUs delivered.
 - Hardware revenue is defined as the sum of the revenue from the hardware system components: CPU revenue, terminal revenue, and peripherals revenue.
 - Installed seats are defined as the total number of seats in active, day-to-day use.
 - Peripherals revenue is defined as the value of all the peripherals of a turnkey sale. (Peripherals in this category typically are input and output devices.)
 - Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.
 - Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
 - Terminal revenue is defined as revenue derived from the sale of terminals that are used to graphically create, analyze, or manipulate designs. The term is applicable only to the host-dependent platform, as terminal revenue is contained within CPU revenue for technical workstations and PCs.
 - Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue).
 - Unit shipment is defined as the number of products delivered (that is, seats).

Table 2
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Worldwide
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	54,026	73,327	84,163	95,284	105,072	116,190	128,640	139,280	144,120	151,780	18	8
Unit Shipments or Seats	57,353	74,357	87,319	98,129	108,122	118,790	130,830	140,980	145,400	152,680	17	7
CPU Installed Base	129,042	195,269	263,672	330,912	394,476	455,880	513,400	564,670	599,310	632,890	32	10
Installed Seats	139,360	206,074	276,770	345,619	410,498	472,320	529,640	579,940	612,770	643,670	31	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	60.2	62.9	52.4	50.1	46.8	46.5	47.0	47.1	47.3	46.8	-6	0
Hardware-Only ASP	14.3	11.3	12.2	11.6	11.0	10.5	10.2	10.2	10.7	11.1	-6	0
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1,098	1,278	1,427	1,481	1,477	1,542	1,635	1,746	1,863	1,993	8	6
CPU Revenue	737	957	1,167	1,238	1,224	1,291	1,387	1,495	1,607	1,737	14	7
Terminal Revenue	137	62	73	69	66	59	51	42	33	25	-17	-18
Peripheral Revenue (Turnkey)	224	259	186	174	187	192	196	208	223	232	-4	4
Software Revenue	828	916	1,073	1,167	1,277	1,366	1,507	1,702	1,906	2,106	11	11
Bundled	305	343	456	395	369	380	381	391	409	426	5	3
Unbundled	524	573	617	772	908	986	1,126	1,311	1,497	1,680	15	13
Service Revenue	285	362	426	525	543	597	680	781	897	1,022	18	13
Total Factory Revenue	2,211	2,556	2,926	3,172	3,297	3,505	3,822	4,228	4,667	5,121	11	9
Increase over Prior Year (%)	18	16	14	8	4	6	9	11	10	10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 3
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Worldwide
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	15,450	23,555	36,830	40,361	44,319	55,000	67,350	80,940	96,650	113,060	30	21
Unit Shipments or Seats	15,450	23,555	36,830	40,361	44,319	55,000	67,350	80,940	96,650	113,060	30	21
CPU Installed Base	41,157	62,506	94,716	127,207	159,677	197,780	238,170	281,010	323,220	376,350	40	19
Installed Seats	41,157	62,506	94,716	127,207	159,677	197,780	238,170	281,010	323,220	376,350	40	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	68.0	62.5	56.9	55.0	54.8	52.1	49.9	48.6	47.4	46.0	-5	-3
Hardware-Only ASP	23.7	19.0	14.6	15.6	13.4	12.1	11.1	10.4	10.0	9.7	-13	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	494	675	813	879	821	898	986	1,096	1,239	1,377	14	11
CPU Revenue	360	496	688	751	696	770	859	961	1,093	1,223	18	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	133	178	126	129	125	127	127	135	146	153	-2	4
Software Revenue	550	658	821	891	982	1,081	1,229	1,423	1,624	1,822	16	13
Bundled	246	291	410	347	309	326	340	359	385	407	6	6
Unbundled	305	367	411	544	673	755	889	1,064	1,239	1,414	22	16
Service Revenue	177	243	305	411	411	461	535	624	727	835	23	15
Total Factory Revenue	1,220	1,576	1,939	2,181	2,214	2,440	2,751	3,142	3,590	4,033	16	13
Increase over Prior Year (%)	41	29	23	12	2	10	13	14	14	12		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 4
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Worldwide
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	848	2,857	3,900	4,090	1,454	1,280	1,150	1,000	850	710	14	-13
Unit Shipments or Seats	4,175	3,887	7,056	6,934	4,504	3,880	3,340	2,700	2,130	1,600	2	-19
CPU Installed Base	4,712	7,316	10,765	14,139	14,602	14,700	14,250	12,850	10,600	7,980	33	-11
Installed Seats	15,030	18,121	23,863	28,846	30,624	31,140	30,490	28,110	24,050	18,760	19	-9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	279.2	331.3	300.7	131.5	112.3	114.7	112.1	99.1	81.8	66.5	-20	-10
Hardware-Only ASP	2,208.5	87.5	75.9	72.5	207.5	196.1	180.2	164.3	149.2	134.8	-45	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	417	339	350	311	213	182	156	127	99	74	-16	-19
CPU Revenue	200	216	235	218	134	113	96	78	60	46	-10	-19
Terminal Revenue	137	62	73	69	66	59	51	42	33	25	-17	-18
Peripheral Revenue (Turnkey)	80	61	43	25	13	10	9	7	5	4	-37	-22
Software Revenue	112	102	82	79	56	47	36	28	22	18	-16	-20
Bundled	41	41	27	27	25	21	17	12	8	5	-11	-27
Unbundled	71	61	55	53	30	25	19	16	14	13	-19	-16
Service Revenue	86	94	93	83	60	53	46	38	31	24	-9	-16
Total Factory Revenue	616	536	524	474	328	281	239	193	151	117	-15	-19
Increase over Prior Year (%)	-1	-13	-2	-10	-31	-14	-15	-19	-21	-23		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 5
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Worldwide
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	3,000	4,120	5,700	7,740	10,060	12,540	NA	33
Unit Shipments or Seats	NA	NA	NA	NA	3,000	4,120	5,700	7,740	10,060	12,540	NA	33
CPU Installed Base	NA	NA	NA	NA	3,000	7,060	12,310	18,820	26,250	35,240	NA	64
Installed Seats	NA	NA	NA	NA	3,000	7,060	12,310	18,820	26,250	35,240	NA	64
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	100.7	94.4	90.0	85.9	81.9	78.4	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	41.2	37.0	34.2	32.8	31.9	31.4	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	140	173	219	281	352	425	NA	25
CPU Revenue	NA	NA	NA	NA	108	134	173	227	288	355	NA	27
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	32	39	46	55	64	70	NA	17
Software Revenue	NA	NA	NA	NA	15	17	23	31	39	48	NA	26
Bundled	NA	NA	NA	NA	4	5	6	8	9	10	NA	24
Unbundled	NA	NA	NA	NA	11	12	17	23	30	37	NA	27
Service Revenue	NA	NA	NA	NA	37	46	61	81	104	130	NA	29
Total Factory Revenue	NA	NA	NA	NA	192	237	304	393	494	602	NA	26
Increase over Prior Year (%)	NA	NA	NA	NA	NA	23	28	29	26	22		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 6
Preliminary History and Forecast

Application:	Electronic Design Automation												
Region:	Worldwide												
Platform:	Personal Computer												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996	
HARDWARE SHIPMENT DATA													
CPU Shipments	37,729	46,916	43,433	50,833	56,299	55,780	54,440	49,590	36,560	25,480	11	-15	
Unit Shipments or Seats	37,729	46,916	43,433	50,833	56,299	55,790	54,440	49,600	36,560	25,480	11	-15	
CPU Installed Base	83,173	125,447	158,191	189,565	217,197	236,340	248,670	251,990	239,240	213,320	27	-0	
Installed Seats	83,173	125,447	158,191	189,565	217,197	236,340	248,670	251,990	239,240	213,320	27	-0	
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)													
Turnkey ASP	11.1	14.8	17.5	18.4	16.4	16.1	15.9	15.7	15.3	15.0	10	-2	
Hardware-Only ASP	4.7	5.3	5.2	5.0	4.8	4.8	4.7	4.6	4.6	4.5	1	-1	
REVENUE DATA (Millions of U.S. Dollars)													
Hardware Revenue	187	264	263	290	303	290	273	242	174	117	13	-17	
CPU Revenue	177	244	245	269	286	274	259	230	166	113	13	-17	
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA	
Peripheral Revenue (Turnkey)	10	20	18	21	17	16	14	12	8	4	15	-24	
Software Revenue	166	156	170	197	224	221	218	221	221	219	8	-0	
Bundled	18	11	19	21	31	28	18	12	7	3	14	-37	
Unbundled	148	145	151	176	194	194	201	208	215	216	7	2	
Service Revenue	22	24	29	31	35	37	38	38	36	33	13	-1	
Total Factory Revenue	375	445	462	518	563	548	529	500	431	369	11	-8	
Increase over Prior Year (%)	-3	19	4	12	9	-3	-3	-5	-14	-14			

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 7
Preliminary History and Forecast

Application: Electronic Design Automation
Region: North America
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	23,772	37,730	37,140	40,612	45,087	50,810	52,930	55,060	55,790	58,820	17	5
Unit Shipments or Seats	25,243	37,890	38,259	42,061	46,609	52,140	53,990	55,800	56,320	59,180	17	5
CPU Installed Base	70,380	103,059	130,215	154,775	178,023	201,880	221,780	237,330	245,140	253,380	26	7
Installed Seats	75,649	107,985	135,518	160,647	184,508	208,800	228,830	244,080	251,150	258,230	25	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	58.1	66.9	58.5	56.1	57.9	54.8	52.4	51.0	49.9	48.7	-0	-3
Hardware-Only ASP	13.6	10.2	12.0	12.0	11.2	10.9	11.0	11.2	11.8	12.1	-5	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	420	534	557	585	580	633	665	698	742	794	8	7
CPU Revenue	275	411	466	490	492	542	574	608	650	702	16	7
Terminal Revenue	54	20	29	35	34	31	25	18	14	10	-11	-22
Peripheral Revenue (Turnkey)	91	104	62	60	54	60	66	72	78	82	-12	9
Software Revenue	349	392	451	503	521	537	591	665	746	826	11	10
Bundled	81	115	132	122	99	108	120	122	126	131	5	6
Unbundled	268	277	319	381	422	429	471	543	620	695	12	11
Service Revenue	126	157	193	244	250	278	319	365	419	474	19	14
Total Factory Revenue	895	1,083	1,200	1,332	1,351	1,447	1,575	1,729	1,906	2,094	11	9
Increase over Prior Year (%)	-0	21	11	11	1	7	9	10	10	10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 8
Preliminary History and Forecast

Application:	Electronic Design Automation										CAGR (%)	CAGR (%)
Region:	North America										1987-1991	1991-1996
Platform:	Technical Workstation											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
HARDWARE SHIPMENT DATA												
CPU Shipments	7,004	10,541	15,602	17,573	20,031	26,050	31,590	36,710	42,850	49,610	30	20
Unit Shipments or Seats	7,004	10,541	15,602	17,573	20,031	26,050	31,590	36,710	42,850	49,610	30	20
CPU Installed Base	22,721	31,670	44,248	57,201	71,052	89,110	108,580	128,360	146,750	169,230	33	19
Installed Seats	22,721	31,670	44,248	57,201	71,052	89,110	108,580	128,360	146,750	169,230	33	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.2	58.8	55.0	53.4	53.9	51.4	49.4	47.9	46.8	45.7	1	-3
Hardware-Only ASP	22.9	19.2	15.0	15.5	12.6	11.4	10.4	9.8	9.4	9.1	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	182	269	307	337	300	351	391	422	468	517	13	11
CPU Revenue	132	198	268	293	275	323	361	391	435	482	20	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	50	70	39	44	25	28	31	32	33	35	-16	7
Software Revenue	218	275	337	385	408	444	515	598	684	770	17	14
Bundled	68	107	128	116	93	104	116	117	121	125	8	6
Unbundled	150	168	209	269	315	340	400	481	563	644	20	15
Service Revenue	76	105	141	193	192	219	257	297	343	392	26	15
Total Factory Revenue	476	648	784	915	899	1,013	1,163	1,317	1,495	1,678	17	13
Increase over Prior Year (%)	18	36	21	17	-2	13	15	13	14	12		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 9
Preliminary History and Forecast

Application: Electronic Design Automation
Region: North America
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	358	1,400	1,948	1,866	434	390	340	280	230	190	5	-15
Unit Shipments or Seats	1,828	1,560	3,066	3,315	1,956	1,720	1,400	1,030	770	550	2	-22
CPU Installed Base	2,518	3,699	5,320	6,754	6,644	6,440	6,010	5,170	4,010	2,800	27	-16
Installed Seats	7,788	8,626	10,623	12,627	13,129	13,360	13,060	11,920	10,030	7,650	14	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	179.5	211.9	193.4	251.9	275.4	237.7	218.4	189.0	178.2	156.2	11	-11
Hardware-Only ASP	3,998.6	85.4	69.3	70.0	215.5	202.7	185.7	168.0	150.5	135.1	-52	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	166	142	149	141	91	78	63	46	35	26	-14	-22
CPU Revenue	73	90	100	94	53	44	35	26	20	15	-8	-22
Terminal Revenue	54	20	29	35	34	31	25	18	14	10	-11	-22
Peripheral Revenue (Turnkey)	39	32	20	11	4	3	2	2	1	1	-43	-25
Software Revenue	47	37	37	32	23	18	10	6	4	3	-16	-35
Bundled	8	6	4	5	5	2	1	1	0	0	-9	-52
Unbundled	39	31	34	27	18	15	9	6	4	3	-17	-33
Service Revenue	40	40	42	39	27	22	17	13	10	8	-10	-22
Total Factory Revenue	253	220	228	211	141	117	90	65	49	36	-14	-24
Increase over Prior Year (%)	-15	-13	4	-7	-33	-17	-23	-28	-25	-27		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 10
Preliminary History and Forecast

Application: Electronic Design Automation
Region: North America
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	1,562	2,230	3,110	4,290	5,510	6,680	NA	34
Unit Shipments or Seats	NA	NA	NA	NA	1,562	2,230	3,110	4,290	5,510	6,680	NA	34
CPU Installed Base	NA	NA	NA	NA	1,562	3,760	6,630	10,260	14,350	19,120	NA	65
Installed Seats	NA	NA	NA	NA	1,562	3,760	6,630	10,260	14,350	19,120	NA	65
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	96.6	91.5	87.2	83.4	79.8	76.4	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	43.3	39.3	36.5	35.1	34.2	33.4	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	77	100	128	167	207	242	NA	26
CPU Revenue	NA	NA	NA	NA	57	74	98	131	164	195	NA	28
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	20	25	30	37	43	47	NA	18
Software Revenue	NA	NA	NA	NA	1	2	3	4	5	6	NA	37
Bundled	NA	NA	NA	NA	1	2	3	4	5	6	NA	37
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	27
Service Revenue	NA	NA	NA	NA	19	25	34	45	57	68	NA	29
Total Factory Revenue	NA	NA	NA	NA	97	127	164	216	269	315	NA	27
Increase over Prior Year (%)	NA	NA	NA	NA	NA	31	29	32	24	17		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 11
Preliminary History and Forecast

Application: Electronic Design Automation
Region: North America
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	16,411	25,789	19,591	21,173	23,059	22,140	17,890	13,780	7,200	2,340	9	-37
Unit Shipments or Seats	16,411	25,789	19,591	21,173	23,059	22,140	17,890	13,780	7,200	2,340	9	-37
CPU Installed Base	45,141	67,689	80,646	90,819	98,765	102,570	100,570	93,540	80,030	62,240	22	-9
Installed Seats	45,141	67,689	80,646	90,819	98,765	102,570	100,570	93,540	80,030	62,240	22	-9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	20.4	98.7	28.3	24.7	21.6	26.1	27.9	26.7	14.2	13.1	1	-10
Hardware-Only ASP	4.2	4.6	5.1	5.0	4.8	4.7	4.6	4.6	4.5	4.4	3	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	72	123	101	107	112	105	83	63	32	10	11	-38
CPU Revenue	71	122	98	103	107	101	81	61	31	10	11	-38
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	1	3	5	5	4	3	2	1	0	31	-40
Software Revenue	84	80	77	86	89	73	63	57	53	47	1	-12
Bundled	4	3	1	0	0	0	0	0	0	0	-55	-36
Unbundled	80	77	76	86	89	73	63	57	53	47	3	-12
Service Revenue	9	12	10	12	13	12	11	10	8	7	9	-12
Total Factory Revenue	165	215	189	206	213	190	157	130	94	65	7	-21
Increase over Prior Year (%)	-15	30	-12	9	4	-11	-17	-17	-28	-31		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 12
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Europe
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	18,821	21,755	27,695	32,354	34,577	37,260	43,080	46,120	43,940	42,330	16	4
Unit Shipments or Seats	19,551	21,939	28,809	33,164	35,465	38,010	43,740	46,620	44,270	42,540	16	4
CPU Installed Base	35,250	55,783	79,991	105,060	127,628	147,910	168,240	185,940	194,810	198,810	38	9
Installed Seats	37,107	57,827	83,149	108,959	132,139	152,680	173,080	190,580	198,890	201,990	37	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	37.6	44.1	48.6	48.7	48.6	48.0	50.4	49.9	50.8	51.7	7	1
Hardware-Only ASP	12.4	13.6	12.6	11.5	10.8	9.9	9.5	9.6	10.7	12.0	-3	2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	300	397	450	471	448	453	499	533	553	588	11	6
CPU Revenue	214	325	381	412	398	403	448	482	505	542	17	6
Terminal Revenue	29	14	28	22	20	18	16	14	10	8	-9	-18
Peripheral Revenue (Turnkey)	57	57	41	38	30	32	35	37	38	38	-15	5
Software Revenue	279	259	281	311	330	370	410	453	492	532	4	10
Bundled	83	82	113	103	98	110	111	114	117	122	4	4
Unbundled	197	177	167	208	232	260	299	339	375	410	4	12
Service Revenue	91	115	142	178	176	188	213	240	270	306	18	12
Total Factory Revenue	670	771	873	960	954	1,011	1,123	1,227	1,315	1,427	9	8
Increase over Prior Year (%)	41	15	13	10	-1	6	11	9	7	8		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 13
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Europe
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,772	7,081	10,759	11,726	11,513	12,900	16,280	20,060	24,700	29,950	25	21
Unit Shipments or Seats	4,772	7,081	10,759	11,726	11,513	12,900	16,280	20,060	24,700	29,950	25	21
CPU Installed Base	10,563	17,267	27,091	36,963	45,295	53,310	61,850	71,240	81,430	95,830	44	16
Installed Seats	10,563	17,267	27,091	36,963	45,295	53,310	61,850	71,240	81,430	95,830	44	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.9	53.5	57.5	54.3	61.2	58.7	56.5	55.0	53.8	52.7	2	-3
Hardware-Only ASP	24.0	22.3	15.5	16.8	15.2	13.8	12.7	11.9	11.4	11.1	-11	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	138	210	244	258	230	234	266	303	352	405	14	12
CPU Revenue	101	167	220	236	214	217	249	285	332	385	21	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	37	43	24	22	16	16	17	18	19	20	-19	5
Software Revenue	192	189	211	232	235	253	279	309	338	371	5	10
Bundled	73	71	106	94	81	87	93	101	109	117	2	8
Unbundled	119	118	105	138	154	166	186	208	229	254	7	10
Service Revenue	57	76	104	140	134	143	162	185	210	240	24	12
Total Factory Revenue	387	475	559	630	599	630	708	797	900	1,015	12	11
Increase over Prior Year (%)	46	23	18	13	-5	5	12	13	13	13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 14

Preliminary History and Forecast

Application: Electronic Design Automation
 Region: Europe
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	95	913	1,140	1,123	353	320	310	280	230	180	39	-13
Unit Shipments or Seats	825	1,097	2,255	1,934	1,241	1,070	970	790	560	390	11	-21
CPU Installed Base	633	1,530	2,614	3,629	3,843	3,980	3,940	3,570	2,930	2,180	57	-11
Installed Seats	2,491	3,575	5,772	7,528	8,354	8,740	8,780	8,210	7,000	5,360	35	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	432.6	263.1	209.8	354.7	336.4	311.3	296.2	281.2	254.3	176.0	-6	-12
Hardware-Only ASP	2,979.5	93.7	94.0	81.0	190.3	180.5	166.4	153.2	139.8	127.6	-50	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	93	101	115	100	68	60	54	45	32	23	-8	-20
CPU Revenue	48	75	76	73	44	39	35	29	20	14	-2	-20
Terminal Revenue	29	14	28	22	20	18	16	14	10	8	-9	-18
Peripheral Revenue (Turnkey)	15	12	11	6	3	3	3	2	2	1	-31	-23
Software Revenue	30	20	14	16	13	15	14	12	9	7	-18	-11
Bundled	5	6	4	6	7	8	8	5	2	0	10	-41
Unbundled	26	15	10	10	7	6	7	7	7	7	-28	1
Service Revenue	24	31	28	29	21	19	18	15	12	9	-4	-16
Total Factory Revenue	147	151	157	145	102	94	87	72	53	39	-9	-17
Increase over Prior Year (%)	50	3	4	-8	-30	-8	-7	-17	-26	-27		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 15

Preliminary History and Forecast

Application: Electronic Design Automation
 Region: Europe
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	810	990	1,360	1,840	2,540	3,440	NA	34
Unit Shipments or Seats	NA	NA	NA	NA	810	990	1,360	1,840	2,540	3,440	NA	34
CPU Installed Base	NA	NA	NA	NA	810	1,790	3,030	4,560	6,440	9,000	NA	62
Installed Seats	NA	NA	NA	NA	810	1,790	3,030	4,560	6,440	9,000	NA	62
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	96.4	91.5	88.1	84.5	81.1	77.9	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	44.8	39.9	36.4	34.3	33.2	32.9	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	39	43	54	68	90	120	NA	25
CPU Revenue	NA	NA	NA	NA	33	36	45	58	78	104	NA	26
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	6	7	9	11	13	15	NA	23
Software Revenue	NA	NA	NA	NA	4	5	8	10	14	19	NA	39
Bundled	NA	NA	NA	NA	1	1	1	2	2	2	NA	28
Unbundled	NA	NA	NA	NA	3	4	6	9	12	17	NA	41
Service Revenue	NA	NA	NA	NA	11	13	17	22	30	41	NA	30
Total Factory Revenue	NA	NA	NA	NA	53	61	78	101	134	179	NA	27
Increase over Prior Year (%)	NA	NA	NA	NA	NA	15	28	29	33	34		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 16

Preliminary History and Forecast

Application: Electronic Design Automation
 Region: Europe
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	13,954	13,761	15,796	19,505	21,902	23,040	25,130	23,930	16,480	8,770	12	-17
Unit Shipments or Seats	13,954	13,761	15,796	19,505	21,902	23,040	25,130	23,930	16,480	8,770	12	-17
CPU Installed Base	24,054	36,986	50,287	64,468	77,679	88,840	99,430	106,570	104,020	91,790	34	3
Installed Seats	24,054	36,986	50,287	64,468	77,679	88,840	99,430	106,570	104,020	91,790	34	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	7.7	10.7	12.9	17.1	13.5	14.8	15.0	15.0	15.0	14.8	15	2
Hardware-Only ASP	4.7	6.0	5.3	5.2	5.0	4.9	4.8	4.7	4.6	4.6	2	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	70	86	92	114	112	117	125	117	79	41	13	-18
CPU Revenue	65	84	85	104	107	111	118	111	75	39	13	-18
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	5	3	7	10	5	6	7	6	4	2	3	-17
Software Revenue	57	49	55	62	78	96	108	121	130	135	8	12
Bundled	5	5	4	3	10	13	8	6	4	2	19	-30
Unbundled	52	45	52	59	68	83	100	115	126	133	7	14
Service Revenue	10	9	9	9	10	13	16	18	18	17	1	11
Total Factory Revenue	136	145	156	185	200	227	250	257	227	193	10	-1
Increase over Prior Year (%)	22	6	8	18	8	13	10	3	-11	-15		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 17
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Asia
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	10,444	13,029	18,107	20,784	23,313	25,380	28,440	31,990	35,930	39,480	22	11
Unit Shipments or Seats	11,494	13,686	18,918	21,229	23,805	25,760	28,760	32,270	36,180	39,710	20	11
CPU Installed Base	21,167	33,459	49,501	66,027	82,375	97,810	112,050	125,370	136,780	149,580	40	13
Installed Seats	24,152	37,078	53,835	70,544	86,884	101,970	115,720	128,500	139,380	151,650	38	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	98.5	84.2	51.4	47.8	42.2	42.2	42.1	43.0	43.7	43.0	-19	0
Hardware-Only ASP	18.9	11.1	12.2	10.6	11.0	10.8	10.3	10.2	10.1	10.0	-13	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	356	332	402	406	428	431	436	468	509	539	5	5
CPU Revenue	232	208	306	321	318	326	337	364	399	426	8	6
Terminal Revenue	51	26	14	9	8	7	7	6	6	6	-37	-7
Peripheral Revenue (Turnkey)	73	97	82	76	102	99	93	97	104	108	9	1
Software Revenue	196	259	337	346	418	450	493	570	649	724	21	12
Bundled	140	145	209	169	171	161	149	153	164	170	5	-0
Unbundled	56	114	127	178	248	289	344	417	485	554	45	17
Service Revenue	65	85	89	100	113	126	142	167	197	227	15	15
Total Factory Revenue	616	677	827	851	960	1,008	1,072	1,205	1,355	1,490	12	9
Increase over Prior Year (%)	35	10	22	3	13	5	6	12	12	10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 18

Preliminary History and Forecast

Application: Electronic Design Automation
 Region: Asia
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,469	5,666	10,359	10,929	12,643	15,870	19,220	23,810	28,620	32,860	38	21
Unit Shipments or Seats	3,469	5,666	10,359	10,929	12,643	15,870	19,220	23,810	28,620	32,860	38	21
CPU Installed Base	7,069	12,521	22,289	31,978	42,365	54,460	66,820	80,320	93,680	109,500	56	21
Installed Seats	7,069	12,521	22,289	31,978	42,365	54,460	66,820	80,320	93,680	109,500	56	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	110.8	78.9	58.0	56.8	52.4	49.5	47.0	45.7	44.6	42.9	-17	-4
Hardware-Only ASP	25.2	13.4	11.9	14.0	13.2	11.9	10.9	10.1	9.8	9.4	-15	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	168	191	259	282	289	311	325	366	414	447	15	9
CPU Revenue	122	127	197	220	205	228	246	281	321	350	14	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	45	65	63	62	84	83	79	85	93	97	17	3
Software Revenue	138	191	273	271	337	380	429	509	591	668	25	15
Bundled	103	112	176	136	135	134	130	139	153	163	7	4
Unbundled	35	79	96	136	202	246	299	370	437	505	55	20
Service Revenue	42	60	59	76	84	98	114	139	168	197	19	19
Total Factory Revenue	348	443	591	629	710	789	868	1,014	1,173	1,312	20	13
Increase over Prior Year (%)	91	27	34	7	13	11	10	17	16	12		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 19
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Asia
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	384	492	739	1,017	638	540	460	400	340	300	14	-14
Unit Shipments or Seats	1,435	1,149	1,550	1,462	1,130	920	770	680	590	530	-6	-14
CPU Installed Base	1,440	1,919	2,597	3,453	3,811	3,990	4,020	3,830	3,410	2,780	28	-6
Installed Seats	4,424	5,538	6,932	7,970	8,319	8,160	7,690	6,960	6,010	4,850	17	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	344.7	518.2	496.6	91.2	77.5	72.4	67.4	63.2	59.3	55.8	-31	-6
Hardware-Only ASP	1,074.5	72.8	61.5	56.9	222.5	201.6	185.9	170.8	157.3	145.1	-33	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	146	89	78	62	47	37	32	27	23	21	-25	-15
CPU Revenue	72	46	53	46	34	27	22	19	16	13	-17	-17
Terminal Revenue	51	26	14	9	8	7	7	6	6	6	-37	-7
Peripheral Revenue (Turnkey)	24	16	11	8	5	4	3	3	2	2	-32	-20
Software Revenue	34	44	29	31	18	14	11	9	8	7	-15	-18
Bundled	28	30	19	16	13	10	8	6	5	4	-18	-21
Unbundled	6	14	10	15	5	3	3	3	3	3	-4	-10
Service Revenue	20	21	21	14	11	10	9	8	7	6	-14	-10
Total Factory Revenue	201	154	128	106	76	61	51	44	38	34	-22	-15
Increase over Prior Year (%)	1	-23	-17	-17	-29	-19	-16	-14	-14	-12		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 20

Preliminary History and Forecast

Application: Electronic Design Automation
 Region: Asia
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	560	800	1,090	1,400	1,730	2,020	NA	29
Unit Shipments or Seats	NA	NA	NA	NA	560	800	1,090	1,400	1,730	2,020	NA	29
CPU Installed Base	NA	NA	NA	NA	560	1,350	2,350	3,520	4,750	6,110	NA	61
Installed Seats	NA	NA	NA	NA	560	1,350	2,350	3,520	4,750	6,110	NA	61
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	113.7	105.7	101.6	97.3	93.1	89.2	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	30.3	27.4	25.2	24.0	23.3	22.7	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	22	27	33	39	46	51	NA	18
CPU Revenue	NA	NA	NA	NA	16	21	26	32	39	44	NA	22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	6	6	7	7	7	7	NA	4
Software Revenue	NA	NA	NA	NA	10	10	13	16	19	23	NA	18
Bundled	NA	NA	NA	NA	2	2	2	2	2	2	NA	6
Unbundled	NA	NA	NA	NA	8	8	11	14	17	20	NA	20
Service Revenue	NA	NA	NA	NA	7	7	10	12	15	18	NA	22
Total Factory Revenue	NA	NA	NA	NA	38	45	55	67	80	91	NA	19
Increase over Prior Year (%)	NA	NA	NA	NA	NA	16	24	22	19	14		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 21
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Asia
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	6,590	6,871	7,008	8,838	9,472	8,170	7,670	6,370	5,240	4,300	9	-15
Unit Shipments or Seats	6,590	6,871	7,008	8,838	9,472	8,180	7,670	6,380	5,240	4,300	9	-15
CPU Installed Base	12,659	19,019	24,614	30,596	35,639	38,000	38,850	37,690	34,940	31,190	30	-3
Installed Seats	12,659	19,019	24,614	30,596	35,639	38,000	38,850	37,690	34,940	31,190	30	-3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	15.1	14.8	19.5	18.7	17.5	16.8	16.2	15.8	15.5	15.3	4	-3
Hardware-Only ASP	5.8	7.1	4.8	4.5	4.4	4.4	4.3	4.3	4.2	4.2	-7	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	41	52	64	62	70	56	46	35	26	20	14	-22
CPU Revenue	38	35	57	56	63	50	42	32	24	18	14	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	16	8	6	7	6	5	3	2	1	18	-27
Software Revenue	23	25	35	44	53	46	41	35	31	27	23	-13
Bundled	9	4	14	17	21	14	9	5	3	1	24	-42
Unbundled	15	21	21	27	33	32	31	30	28	26	22	-4
Service Revenue	3	4	9	10	12	11	9	8	7	6	43	-14
Total Factory Revenue	68	80	108	116	136	113	96	79	64	53	19	-17
Increase over Prior Year (%)	-12	18	35	8	16	-17	-15	-19	-19	-18		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 22
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Rest of World
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	989	813	1,222	1,535	2,095	2,740	4,180	6,120	8,470	11,150	21	40
Unit Shipments or Seats	1,065	841	1,333	1,675	2,243	2,880	4,350	6,290	8,630	11,250	20	38
CPU Installed Base	2,245	2,969	3,966	5,051	6,449	8,280	11,330	16,040	22,580	31,120	30	37
Installed Seats	2,452	3,184	4,268	5,469	6,967	8,870	12,000	16,780	23,350	31,800	30	35
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	49.6	37.2	70.9	62.0	62.5	73.3	71.0	66.3	58.7	55.1	6	-2
Hardware-Only ASP	20.8	17.4	12.5	11.3	9.5	8.5	7.7	7.1	6.7	6.1	-18	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	22	16	18	19	21	25	34	46	59	72	-1	27
CPU Revenue	16	13	14	14	17	21	29	40	53	66	1	31
Terminal Revenue	3	2	3	3	3	3	3	4	3	2	1	-8
Peripheral Revenue (Turnkey)	3	1	1	1	1	1	2	2	3	3	-21	25
Software Revenue	4	6	4	7	8	10	13	14	19	24	15	26
Bundled	1	1	1	1	1	1	2	2	2	3	-10	25
Unbundled	3	5	3	6	7	8	11	12	17	21	23	26
Service Revenue	3	4	3	4	4	5	6	8	12	15	4	32
Total Factory Revenue	30	26	25	29	33	39	53	68	91	111	2	28
Increase over Prior Year (%)	-39	-13	-1	16	11	20	36	28	33	22		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 23

Preliminary History and Forecast

Application: Electronic Design Automation
 Region: Rest of World
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	205	267	111	134	131	180	260	360	490	640	-10	37
Unit Shipments or Seats	205	267	111	134	131	180	260	360	490	640	-10	37
CPU Installed Base	805	1,049	1,088	1,065	964	900	920	1,080	1,360	1,790	5	13
Installed Seats	805	1,049	1,088	1,065	964	900	920	1,080	1,360	1,790	5	13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	51.8	28.2	50.7	45.4	49.4	47.5	45.7	44.3	43.3	41.9	-1	-3
Hardware-Only ASP	26.8	18.7	23.8	20.6	13.8	12.9	12.0	11.4	11.0	10.7	-15	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	6	5	3	3	2	3	4	5	7	8	-22	31
CPU Revenue	5	5	3	2	2	2	3	4	5	7	-23	32
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	1	1	0	1	1	1	1	2	-20	26
Software Revenue	2	3	1	2	2	3	5	6	11	14	6	42
Bundled	1	1	0	1	1	1	1	1	2	2	-15	32
Unbundled	1	2	1	1	2	3	4	5	9	11	21	45
Service Revenue	1	2	1	1	1	2	2	3	5	6	-4	40
Total Factory Revenue	9	10	6	7	6	8	11	14	22	28	-11	38
Increase over Prior Year (%)	-46	8	-42	17	-16	40	45	20	62	25		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 24
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Rest of World
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	11	51	73	83	29	30	40	40	50	40	26	7
Unit Shipments or Seats	87	80	184	223	177	180	200	210	210	130	19	-6
CPU Installed Base	121	168	234	303	305	290	290	270	250	210	26	-7
Installed Seats	328	382	536	722	822	880	960	1,020	1,020	890	26	2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	330.9	590.0	665.2	382.0	314.4	306.5	299.8	287.8	278.4	268.8	-1	-3
Hardware-Only ASP	1,822.3	127.8	107.5	103.1	248.8	233.2	212.9	193.0	173.4	144.8	-39	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	13	7	9	9	7	7	8	8	8	6	-13	-5
CPU Revenue	8	5	6	5	4	4	4	4	4	3	-17	-3
Terminal Revenue	3	2	3	3	3	3	3	4	3	2	1	-8
Peripheral Revenue (Turnkey)	2	0	0	0	0	0	0	0	0	0	-38	-1
Software Revenue	1	1	1	1	1	1	1	1	1	1	0	5
Bundled	0	0	0	0	0	0	1	1	1	1	11	11
Unbundled	0	1	0	0	0	0	0	0	0	0	-7	-5
Service Revenue	2	2	2	2	2	2	2	2	2	2	-0	2
Total Factory Revenue	15	11	11	12	9	9	10	11	11	8	-11	-3
Increase over Prior Year (%)	-47	-28	6	4	-21	-4	15	7	-1	-25		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 25
Preliminary History and Forecast

Application: Electronic Design Automation
Region: Rest of World
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	68	100	140	210	290	400	NA	42
Unit Shipments or Seats	NA	NA	NA	NA	68	100	140	210	290	400	NA	42
CPU Installed Base	NA	NA	NA	NA	68	170	300	480	710	1,010	NA	71
Installed Seats	NA	NA	NA	NA	68	170	300	480	710	1,010	NA	71
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	93.8	85.3	86.2	82.6	77.2	74.8	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	35.7	33.9	31.9	30.8	30.4	30.0	NA	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	2	3	5	6	9	12	NA	37
CPU Revenue	NA	NA	NA	NA	2	3	4	6	8	11	NA	37
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	1	1	1	NA	35
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	1	1	1	2	3	4	NA	43
Total Factory Revenue	NA	NA	NA	NA	3	4	6	8	12	16	NA	38
Increase over Prior Year (%)	NA	NA	NA	NA	NA	40	38	41	38	35		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 26
Preliminary History and Forecast

Application:	Electronic Design Automation											
Region:	Rest of World											
Platform:	Personal Computer											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	773	495	1,038	1,317	1,866	2,430	3,740	5,510	7,640	10,070	25	40
Unit Shipments or Seats	773	495	1,038	1,317	1,866	2,430	3,740	5,510	7,640	10,070	25	40
CPU Installed Base	1,319	1,753	2,643	3,683	5,113	6,930	9,830	14,200	20,260	28,110	40	41
Installed Seats	1,319	1,753	2,643	3,683	5,113	6,930	9,830	14,200	20,260	28,110	40	41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	9.3	21.3	25.9	16.1	22.6	46.3	68.8	94.9	11.2	.0	25	-100
Hardware-Only ASP	4.8	6.2	5.3	5.0	5.0	4.9	4.8	4.8	4.7	4.6	1	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	3	6	7	10	12	18	26	36	46	27	37
CPU Revenue	4	3	5	7	9	12	18	26	35	45	27	37
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	24	28
Software Revenue	2	2	3	4	5	5	6	7	8	10	25	16
Bundled	0	0	0	0	0	0	0	0	0	0	-33	-100
Unbundled	2	2	2	4	5	5	6	7	8	10	29	16
Service Revenue	0	0	0	0	0	1	1	2	2	3	14	52
Total Factory Revenue	6	5	9	11	15	18	26	35	46	59	26	32
Increase over Prior Year (%)	54	-8	61	29	32	23	42	37	31	28		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 27
Preliminary History and Forecast

Application: Electronic CAE
Region: Worldwide
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	28,759	39,113	53,461	60,845	66,444	71,580	77,280	78,650	73,020	68,680	23	1
Unit Shipments or Seats	29,870	39,116	54,435	61,664	67,312	72,250	77,890	79,200	73,540	69,160	23	1
CPU Installed Base	81,507	115,174	157,468	200,224	241,650	280,700	315,320	340,280	347,050	344,860	31	7
Installed Seats	83,936	117,561	160,750	204,201	246,206	285,370	319,950	344,760	351,210	348,450	31	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	48.0	49.6	48.7	43.8	40.8	41.4	41.6	41.8	42.2	41.9	-4	1
Hardware-Only ASP	14.8	11.2	9.9	9.6	9.2	8.9	8.8	9.1	10.1	11.1	-11	4
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	534	626	741	759	753	784	828	858	875	895	9	4
CPU Revenue	352	463	605	639	635	665	702	727	738	753	16	3
Terminal Revenue	47	15	25	22	21	17	16	15	15	14	-18	-8
Peripheral Revenue (Turnkey)	135	147	111	99	96	103	109	116	122	128	-8	6
Software Revenue	393	462	602	657	729	781	857	963	1,075	1,183	17	10
Bundled	143	158	238	178	165	166	171	170	174	186	4	2
Unbundled	250	304	364	479	564	615	686	793	901	997	23	12
Service Revenue	140	181	226	281	296	327	368	417	473	528	21	12
Total Factory Revenue	1,067	1,269	1,570	1,696	1,778	1,893	2,053	2,238	2,422	2,606	14	8
Increase over Prior Year (%)	12	19	24	8	5	6	8	9	8	8		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 28
Preliminary History and Forecast

Application:	Electronic CAE											
Region:	Worldwide											
Platform:	Technical Workstation											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	9,302	14,115	19,738	20,407	21,784	25,840	29,940	33,360	37,470	40,930	24	13
Unit Shipments or Seats	9,302	14,115	19,738	20,407	21,784	25,840	29,940	33,360	37,470	40,930	24	13
CPU Installed Base	26,424	38,865	55,323	70,532	84,974	100,820	115,850	129,280	139,940	152,870	34	12
Installed Seats	26,424	38,865	55,323	70,532	84,974	100,820	115,850	129,280	139,940	152,870	34	12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	52.1	50.1	52.5	49.1	47.6	45.6	44.0	42.6	41.4	40.1	-2	-3
Hardware-Only ASP	24.3	18.8	14.5	16.2	14.2	12.9	11.8	11.1	10.7	10.4	-13	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	244	351	415	430	380	410	437	456	490	519	12	6
CPU Revenue	167	252	345	356	327	354	379	396	427	451	18	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	77	99	70	74	53	55	58	60	64	68	-9	5
Software Revenue	270	331	445	465	530	586	661	760	863	963	18	13
Bundled	127	146	219	154	136	144	152	154	163	176	2	5
Unbundled	143	184	226	311	394	442	509	605	700	787	29	15
Service Revenue	94	128	165	222	227	253	287	326	371	415	25	13
Total Factory Revenue	608	809	1,025	1,118	1,137	1,248	1,385	1,542	1,724	1,897	17	11
Increase over Prior Year (%)	44	33	27	9	2	10	11	11	12	10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 29
Preliminary History and Forecast

Application: Electronic CAE
Region: Worldwide
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	374	1,468	1,754	1,876	538	490	470	450	440	430	10	-4
Unit Shipments or Seats	1,485	1,471	2,728	2,694	1,406	1,160	1,060	1,000	960	910	-1	-8
CPU Installed Base	1,689	3,118	4,775	6,452	6,655	6,660	6,400	5,720	4,720	3,660	41	-11
Installed Seats	4,118	5,505	8,057	10,430	11,212	11,330	11,020	10,200	8,890	7,250	28	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	201.0	196.0	174.9	90.8	76.6	71.9	68.0	61.3	55.1	49.8	-21	-8
Hardware-Only ASP	3,507.4	80.0	69.7	62.6	202.5	183.8	169.1	155.7	143.3	132.0	-51	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	195	141	139	119	70	59	53	49	46	43	-23	-9
CPU Revenue	95	87	86	84	44	38	34	31	29	27	-18	-9
Terminal Revenue	47	15	25	22	21	17	16	15	15	14	-18	-8
Peripheral Revenue (Turnkey)	53	39	28	12	5	4	3	3	3	2	-46	-14
Software Revenue	43	37	33	40	25	20	14	10	7	5	-12	-26
Bundled	7	5	4	7	8	6	5	4	3	2	3	-22
Unbundled	35	32	29	33	17	14	9	6	4	3	-17	-29
Service Revenue	34	39	40	34	22	19	17	15	14	13	-11	-10
Total Factory Revenue	272	217	212	192	117	98	84	73	67	61	-19	-12
Increase over Prior Year (%)	6	-20	-2	-9	-39	-16	-15	-12	-9	-9		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 30
Preliminary History and Forecast

Application: Electronic CAE
Region: Worldwide
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	1,642	2,190	2,980	4,070	5,390	6,720	NA	33
Unit Shipments or Seats	NA	NA	NA	NA	1,642	2,190	2,980	4,080	5,390	6,720	NA	33
CPU Installed Base	NA	NA	NA	NA	1,642	3,800	6,530	9,940	13,930	18,760	NA	63
Installed Seats	NA	NA	NA	NA	1,642	3,800	6,530	9,940	13,930	18,760	NA	63
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	99.3	93.8	90.1	86.3	82.7	79.4	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	41.2	37.5	34.5	33.1	32.1	31.5	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	82	100	124	159	200	240	NA	24
CPU Revenue	NA	NA	NA	NA	56	69	87	116	151	186	NA	27
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	26	31	37	43	50	54	NA	15
Software Revenue	NA	NA	NA	NA	5	8	11	16	21	28	NA	39
Bundled	NA	NA	NA	NA	1	1	2	3	4	5	NA	40
Unbundled	NA	NA	NA	NA	5	6	9	13	17	24	NA	39
Service Revenue	NA	NA	NA	NA	21	27	34	45	58	72	NA	28
Total Factory Revenue	NA	NA	NA	NA	108	135	170	220	280	340	NA	26
Increase over Prior Year (%)	NA	NA	NA	NA	NA	24	26	30	27	21		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 31
Preliminary History and Forecast

Application: Electronic CAE
Region: Worldwide
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	19,083	23,530	31,969	38,563	42,479	43,060	43,900	40,760	29,720	20,600	22	-13
Unit Shipments or Seats	19,083	23,530	31,969	38,563	42,479	43,060	43,900	40,760	29,720	20,600	22	-13
CPU Installed Base	53,394	73,191	97,370	123,239	148,379	169,420	186,550	195,330	188,460	169,580	29	3
Installed Seats	53,394	73,191	97,370	123,239	148,379	169,420	186,550	195,330	188,460	169,580	29	3
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	12.2	19.1	22.4	20.4	18.2	17.9	17.2	16.8	16.1	15.7	11	-3
Hardware-Only ASP	4.7	5.2	5.1	5.0	4.7	4.7	4.6	4.6	4.5	4.4	0	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	95	133	187	210	221	216	214	194	138	93	23	-16
CPU Revenue	90	124	174	198	208	204	202	184	131	89	23	-16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	5	9	13	12	13	12	12	10	7	4	24	-22
Software Revenue	81	94	124	152	168	167	171	178	184	187	20	2
Bundled	9	7	15	17	20	16	12	9	5	2	21	-35
Unbundled	71	88	108	135	148	152	159	169	179	184	20	4
Service Revenue	12	15	22	24	27	28	30	31	30	28	23	0
Total Factory Revenue	188	243	333	386	416	411	415	402	351	307	22	-6
Increase over Prior Year (%)	-32	29	37	16	8	-1	1	-3	-13	-13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 32
Preliminary History and Forecast

Application:	Electronic CAE												
Region:	North America												
Platform:	All Platforms												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996	
HARDWARE SHIPMENT DATA													
CPU Shipments	13,112	20,678	23,776	25,689	28,083	29,760	29,380	28,850	26,190	24,600	21	-3	
Unit Shipments or Seats	13,583	20,648	24,113	26,162	28,578	30,120	29,700	29,140	26,480	24,860	20	-3	
CPU Installed Base	47,588	64,246	80,551	95,258	109,528	122,830	132,200	137,000	134,560	129,670	23	3	
Installed Seats	48,749	65,338	81,900	96,989	111,624	125,060	134,480	139,290	136,760	131,600	23	3	
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)													
Turnkey ASP	50.7	59.4	58.1	55.0	58.3	55.8	53.4	52.5	51.6	50.3	4	-3	
Hardware-Only ASP	14.9	10.1	9.8	10.1	9.6	9.4	9.9	10.5	12.2	13.6	-10	7	
REVENUE DATA (Millions of U.S. Dollars)													
Hardware Revenue	241	299	315	322	318	334	345	356	367	378	7	4	
CPU Revenue	153	221	261	268	269	284	292	301	308	317	15	3	
Terminal Revenue	22	7	10	12	12	9	8	7	7	7	-15	-10	
Peripheral Revenue (Turnkey)	66	72	44	42	37	41	45	48	52	54	-14	8	
Software Revenue	181	232	296	331	357	370	398	442	486	522	19	8	
Bundled	51	71	84	67	56	61	66	62	61	63	2	3	
Unbundled	130	162	212	264	301	309	332	380	425	459	23	9	
Service Revenue	71	91	113	136	146	161	182	206	233	256	20	12	
Total Factory Revenue	493	623	723	788	821	865	924	1,004	1,086	1,157	14	7	
Increase over Prior Year (%)	-2	26	16	9	4	5	7	9	8	6			

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 33
Preliminary History and Forecast

Application: Electronic CAE
Region: North America
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,475	6,589	8,537	9,094	9,930	12,220	14,480	16,160	18,230	19,930	22	15
Unit Shipments or Seats	4,475	6,589	8,537	9,094	9,930	12,220	14,480	16,160	18,230	19,930	22	15
CPU Installed Base	15,473	20,786	27,055	32,934	38,840	46,110	53,670	60,760	66,710	73,620	26	14
Installed Seats	15,473	20,786	27,055	32,934	38,840	46,110	53,670	60,760	66,710	73,620	26	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	43.1	52.2	55.4	53.0	53.1	50.7	48.6	47.2	46.0	45.0	5	-3
Hardware-Only ASP	23.7	19.0	14.8	16.2	13.4	12.2	11.2	10.5	10.2	9.9	-13	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	105	159	176	186	157	176	192	198	212	224	11	7
CPU Revenue	73	115	151	154	142	160	174	181	194	205	18	8
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	32	44	25	32	15	16	18	17	18	18	-18	4
Software Revenue	115	163	219	242	274	300	341	392	441	481	24	12
Bundled	45	67	83	65	53	59	64	59	58	60	4	3
Unbundled	69	96	136	177	221	241	277	333	383	421	34	14
Service Revenue	46	63	84	109	114	128	148	168	191	211	25	13
Total Factory Revenue	265	385	479	537	546	604	681	758	844	916	20	11
Increase over Prior Year (%)	25	45	24	12	2	11	13	11	11	9		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 34
Preliminary History and Forecast

Application:	Electronic CAE											
Region:	North America											
Platform:	Host-Dependent											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	265	773	889	876	161	130	120	120	130	130	-12	-4
Unit Shipments or Seats	736	744	1,227	1,349	656	500	440	410	420	390	-3	-10
CPU Installed Base	1,101	1,845	2,670	3,422	3,371	3,200	2,900	2,440	1,870	1,340	32	-17
Installed Seats	2,263	2,937	4,020	5,153	5,466	5,440	5,190	4,720	4,070	3,270	25	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	134.2	185.1	152.8	167.2	220.6	210.7	202.1	193.7	185.5	178.1	13	-4
Hardware-Only ASP	3,668.5	78.5	63.3	61.3	211.2	192.3	176.5	161.8	148.2	136.3	-51	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	99	76	65	58	32	25	21	19	20	18	-24	-11
CPU Revenue	44	42	39	39	19	15	13	11	11	10	-19	-11
Terminal Revenue	22	7	10	12	12	9	8	7	7	7	-15	-10
Peripheral Revenue (Turnkey)	33	27	17	7	2	1	1	1	1	1	-52	-17
Software Revenue	23	20	20	19	13	11	6	3	2	1	-14	-43
Bundled	3	2	0	1	2	1	1	1	0	0	-6	-43
Unbundled	20	19	19	18	11	10	5	2	1	1	-15	-43
Service Revenue	20	20	20	17	11	9	7	6	5	5	-14	-15
Total Factory Revenue	141	116	106	94	56	45	34	28	27	24	-21	-16
Increase over Prior Year (%)	-7	-18	-9	-11	-41	-20	-24	-17	-5	-11		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 35

Preliminary History and Forecast

Application: Electronic CAE
 Region: North America
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	822	1,100	1,480	2,070	2,690	3,250	NA	32
Unit Shipments or Seats	NA	NA	NA	NA	822	1,100	1,480	2,070	2,690	3,250	NA	32
CPU Installed Base	NA	NA	NA	NA	822	1,900	3,260	5,010	6,990	9,290	NA	62
Installed Seats	NA	NA	NA	NA	822	1,900	3,260	5,010	6,990	9,290	NA	62
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	99.2	94.8	90.9	87.1	83.4	80.1	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	46.5	42.3	38.9	36.9	35.8	35.1	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	47	57	70	92	113	131	NA	23
CPU Revenue	NA	NA	NA	NA	30	37	47	63	80	96	NA	26
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	17	21	24	29	33	35	NA	16
Software Revenue	NA	NA	NA	NA	1	1	1	2	3	3	NA	38
Bundled	NA	NA	NA	NA	1	1	1	2	2	3	NA	39
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	28
Service Revenue	NA	NA	NA	NA	11	14	18	24	30	35	NA	25
Total Factory Revenue	NA	NA	NA	NA	59	73	90	117	145	169	NA	24
Increase over Prior Year (%)	NA	NA	NA	NA	NA	24	23	31	24	16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 36
Preliminary History and Forecast

Application: Electronic CAE
Region: North America
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	8,373	13,316	14,350	15,719	17,170	16,300	13,290	10,500	5,140	1,290	20	-40
Unit Shipments or Seats	8,373	13,316	14,350	15,719	17,170	16,300	13,290	10,500	5,140	1,290	20	-40
CPU Installed Base	31,013	41,615	50,825	58,902	66,495	71,610	72,360	68,800	58,990	45,410	21	-7
Installed Seats	31,013	41,615	50,825	58,902	66,495	71,610	72,360	68,800	58,990	45,410	21	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	32.9	88.0	32.1	59.7	62.5	61.9	60.9	60.0	59.1	57.7	17	-2
Hardware-Only ASP	4.3	4.5	5.1	5.0	4.7	4.7	4.6	4.5	4.4	4.3	2	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	38	65	74	79	82	76	61	48	23	6	21	-42
CPU Revenue	37	64	71	75	78	73	59	46	22	5	21	-42
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	1	3	3	3	3	2	2	1	0	33	-43
Software Revenue	44	49	57	69	70	58	50	45	41	37	12	-12
Bundled	3	2	0	0	0	0	0	0	0	0	-68	-100
Unbundled	41	47	57	69	69	58	50	45	41	37	14	-12
Service Revenue	6	8	8	9	10	9	9	8	7	5	16	-12
Total Factory Revenue	87	121	139	157	161	144	120	100	71	48	17	-22
Increase over Prior Year (%)	-39	39	15	13	2	-11	-17	-16	-30	-32		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 37
Preliminary History and Forecast

Application: Electronic CAE
Region: Europe
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	10,097	11,704	18,406	21,616	23,440	26,760	30,770	30,910	25,470	19,810	23	-3
Unit Shipments or Seats	10,394	11,676	18,805	21,839	23,683	26,960	30,950	31,080	25,610	19,930	23	-3
CPU Installed Base	20,323	31,188	47,419	64,798	81,377	98,130	114,790	127,350	129,670	123,800	41	9
Installed Seats	20,852	31,691	48,322	65,909	82,666	99,490	116,180	128,690	130,890	124,820	41	9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	33.7	40.0	49.8	47.2	47.9	46.3	44.8	45.4	48.2	50.8	9	1
Hardware-Only ASP	12.6	13.6	10.1	9.5	8.8	8.4	8.1	8.3	9.6	12.0	-9	6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	153	205	250	261	252	274	300	309	298	287	13	3
CPU Revenue	104	162	205	225	221	240	263	271	259	248	21	2
Terminal Revenue	10	4	11	7	7	6	6	6	5	5	-9	-6
Peripheral Revenue (Turnkey)	39	40	35	29	25	28	31	32	33	34	-11	6
Software Revenue	129	132	157	181	199	224	255	287	317	342	11	11
Bundled	40	43	65	54	50	51	55	58	61	63	6	5
Unbundled	90	90	93	127	149	173	200	229	257	280	14	13
Service Revenue	40	57	75	93	92	102	115	129	143	157	23	11
Total Factory Revenue	322	394	483	535	543	600	669	725	758	786	14	8
Increase over Prior Year (%)	46	23	22	11	2	10	11	8	5	4		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 38
Preliminary History and Forecast

Application: Electronic CAE
Region: Europe
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,030	4,279	6,101	6,294	6,161	7,190	8,140	8,960	9,850	10,410	19	11
Unit Shipments or Seats	3,030	4,279	6,101	6,294	6,161	7,190	8,140	8,960	9,850	10,410	19	11
CPU Installed Base	6,387	10,441	15,976	21,158	25,419	29,690	33,340	36,320	38,330	40,790	41	10
Installed Seats	6,387	10,441	15,976	21,158	25,419	29,690	33,340	36,320	38,330	40,790	41	10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	44.4	46.0	55.5	53.9	61.3	58.8	56.6	55.1	53.9	52.8	8	-3
Hardware-Only ASP	24.5	21.9	15.2	16.9	15.4	14.0	12.9	12.1	11.7	11.3	-11	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	74	114	135	140	125	132	138	144	154	158	14	5
CPU Revenue	49	84	113	119	110	117	122	128	136	140	22	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	25	30	22	21	14	15	16	17	18	18	-13	5
Software Revenue	92	95	116	129	138	148	160	175	190	201	11	8
Bundled	36	38	62	50	44	45	48	51	56	60	5	6
Unbundled	56	57	54	80	94	102	113	124	134	142	14	9
Service Revenue	27	38	56	74	72	77	84	93	102	110	28	9
Total Factory Revenue	193	248	306	344	334	357	383	413	445	469	15	7
Increase over Prior Year (%)	74	28	24	12	-3	7	7	8	8	5		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 39
Preliminary History and Forecast

Application: Electronic CAE
Region: Europe
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	18	482	528	513	125	130	130	130	120	130	63	1
Unit Shipments or Seats	315	454	926	736	367	330	320	290	260	250	4	-7
CPU Installed Base	177	656	1,168	1,650	1,733	1,790	1,770	1,600	1,320	1,030	77	-10
Installed Seats	707	1,158	2,071	2,762	3,021	3,150	3,150	2,940	2,530	2,050	44	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	658.6	149.1	113.8	279.3	265.8	175.9	167.2	160.7	153.9	145.2	-20	-11
Hardware-Only ASP	NA	86.7	87.0	71.1	186.1	172.2	158.7	146.2	134.2	123.8	NA	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	42	45	47	38	22	21	20	18	16	15	-15	-7
CPU Revenue	21	33	29	29	14	14	13	12	10	10	-9	-7
Terminal Revenue	10	4	11	7	7	6	6	6	5	5	-9	-6
Peripheral Revenue (Turnkey)	11	7	7	3	1	1	1	1	1	1	-43	-11
Software Revenue	13	10	6	9	6	4	4	3	3	2	-16	-19
Bundled	1	1	0	2	2	1	1	1	1	0	32	-31
Unbundled	12	8	6	7	4	3	3	2	2	2	-24	-15
Service Revenue	8	13	12	12	7	7	6	6	5	5	-2	-7
Total Factory Revenue	63	68	65	59	36	32	30	28	24	23	-13	-9
Increase over Prior Year (%)	64	8	-4	-9	-40	-9	-6	-9	-13	-6		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 40
Preliminary History and Forecast

Application: Electronic CAE
Region: Europe
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	454	620	890	1,270	1,820	2,430	NA	40
Unit Shipments or Seats	NA	NA	NA	NA	454	620	890	1,270	1,820	2,430	NA	40
CPU Installed Base	NA	NA	NA	NA	454	1,060	1,880	2,960	4,380	6,250	NA	69
Installed Seats	NA	NA	NA	NA	454	1,060	1,880	2,960	4,380	6,250	NA	69
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	97.1	91.6	88.2	84.7	81.1	78.0	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	41.0	37.1	34.0	32.3	31.3	30.6	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	21	26	34	46	63	81	NA	31
CPU Revenue	NA	NA	NA	NA	17	20	27	37	52	68	NA	33
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue												
(Turnkey)	NA	NA	NA	NA	4	6	7	9	11	13	NA	25
Software Revenue	NA	NA	NA	NA	3	5	7	10	13	18	NA	41
Bundled	NA	NA	NA	NA	0	0	1	1	1	1	NA	40
Unbundled	NA	NA	NA	NA	3	4	6	9	12	17	NA	41
Service Revenue	NA	NA	NA	NA	5	8	10	14	20	27	NA	38
Total Factory Revenue	NA	NA	NA	NA	30	38	52	70	96	126	NA	34
Increase over Prior Year (%)	NA	NA	NA	NA	NA	30	35	35	37	31		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 41
Preliminary History and Forecast

Application: Electronic CAE
Region: Europe
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,049	6,943	11,777	14,809	16,699	18,820	21,600	20,560	13,680	6,840	24	-16
Unit Shipments or Seats	7,049	6,943	11,777	14,809	16,699	18,820	21,600	20,560	13,680	6,840	24	-16
CPU Installed Base	13,759	20,092	30,275	41,989	53,771	65,580	77,800	86,470	85,640	75,740	41	7
Installed Seats	13,759	20,092	30,275	41,989	53,771	65,580	77,800	86,470	85,640	75,740	41	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	9.5	14.3	20.2	19.0	13.8	15.3	15.2	15.2	15.1	14.8	10	1
Hardware-Only ASP	4.8	6.1	5.2	5.2	4.9	4.8	4.7	4.7	4.6	4.5	1	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	37	46	68	83	85	95	107	100	65	32	23	-18
CPU Revenue	34	44	63	78	80	89	101	94	61	30	24	-18
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	3	2	6	5	5	6	6	6	4	2	14	-17
Software Revenue	24	28	36	43	52	67	84	99	111	121	21	18
Bundled	3	3	3	3	3	5	5	5	3	2	3	-15
Unbundled	21	25	33	40	48	63	79	94	108	119	23	20
Service Revenue	5	5	7	7	8	10	13	16	16	15	13	14
Total Factory Revenue	66	79	111	133	144	172	204	214	192	168	22	3
Increase over Prior Year (%)	-7	20	41	19	9	20	18	5	-10	-13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 42
Preliminary History and Forecast

Application: Electronic CAE
Region: Asia
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,995	6,278	10,394	12,402	13,369	12,900	13,690	13,720	14,110	14,650	28	2
Unit Shipments or Seats	5,308	6,335	10,599	12,488	13,461	12,970	13,750	13,770	14,150	14,690	26	2
CPU Installed Base	12,207	17,961	26,983	36,793	46,244	53,650	59,550	62,980	64,030	65,010	40	7
Installed Seats	12,797	18,611	27,842	37,729	47,203	54,520	60,290	63,590	64,530	65,380	39	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	68.4	51.0	41.4	34.3	29.9	30.4	30.9	31.2	31.1	30.6	-19	0
Hardware-Only ASP	18.4	10.7	9.5	8.8	9.4	9.5	9.1	9.2	9.5	9.7	-15	1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	127	113	167	166	171	162	162	162	169	178	8	1
CPU Revenue	85	75	131	137	135	127	128	127	132	139	12	1
Terminal Revenue	14	3	4	2	2	2	1	1	1	1	-36	-16
Peripheral Revenue (Turnkey)	28	35	32	27	34	33	33	34	35	38	5	2
Software Revenue	81	93	146	140	168	180	196	224	261	307	20	13
Bundled	52	44	89	56	59	53	50	49	52	58	3	-0
Unbundled	28	49	57	84	108	127	146	175	210	249	40	18
Service Revenue	27	32	37	50	56	62	68	78	92	108	20	14
Total Factory Revenue	235	238	350	357	395	404	426	464	522	594	14	8
Increase over Prior Year (%)	17	1	47	2	11	2	6	9	12	14		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 43
Preliminary History and Forecast

Application: Electronic CAE
Region: Asia
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,634	3,073	5,044	4,958	5,637	6,370	7,220	8,130	9,260	10,430	36	13
Unit Shipments or Seats	1,634	3,073	5,044	4,958	5,637	6,370	7,220	8,130	9,260	10,430	36	13
CPU Installed Base	4,000	6,916	11,562	15,758	20,137	24,540	28,420	31,790	34,440	37,930	50	14
Installed Seats	4,000	6,916	11,562	15,758	20,137	24,540	28,420	31,790	34,440	37,930	50	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	83.5	53.4	47.3	40.9	35.3	33.4	32.1	31.1	30.4	29.7	-19	-3
Hardware-Only ASP	25.7	13.3	11.9	15.0	14.2	13.0	11.9	11.2	10.8	10.5	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	60	75	103	103	97	100	105	112	122	135	13	7
CPU Revenue	41	51	80	82	74	77	81	86	95	104	16	7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	19	24	23	21	23	23	24	25	27	31	5	6
Software Revenue	62	71	110	92	117	136	156	188	227	274	17	19
Bundled	45	40	74	39	39	39	40	43	47	55	-4	7
Unbundled	17	30	37	54	78	97	116	145	180	219	46	23
Service Revenue	20	25	23	38	40	46	53	63	77	93	19	18
Total Factory Revenue	142	171	236	234	254	282	314	363	426	501	16	15
Increase over Prior Year (%)	59	20	39	-1	9	11	11	15	17	18		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 44
Preliminary History and Forecast

Application:	Electronic CAE												
Region:	Asia												
Platform:	Host-Dependent												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996	
HARDWARE SHIPMENT DATA													
CPU Shipments	87	187	306	453	243	220	200	180	160	140	29	-10	
Unit Shipments or Seats	400	245	511	539	335	280	250	230	200	180	-4	-12	
CPU Installed Base	348	533	825	1,241	1,417	1,540	1,610	1,570	1,430	1,190	42	-3	
Installed Seats	939	1,183	1,684	2,177	2,376	2,410	2,340	2,190	1,920	1,560	26	-8	
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)													
Turnkey ASP	319.5	425.1	357.2	58.0	54.5	52.1	49.9	47.9	45.8	44.1	-36	-4	
Hardware-Only ASP	1,552.3	63.0	55.5	45.4	216.6	190.5	174.9	161.3	147.7	135.1	-39	-9	
REVENUE DATA (Millions of U.S. Dollars)													
Hardware Revenue	48	18	24	20	14	11	9	8	7	6	-27	-15	
CPU Revenue	27	10	15	15	10	8	7	6	5	4	-22	-15	
Terminal Revenue	14	3	4	2	2	2	1	1	1	1	-36	-16	
Peripheral Revenue (Turnkey)	8	4	4	3	2	1	1	1	1	1	-32	-15	
Software Revenue	7	6	7	11	6	4	4	3	3	2	-3	-17	
Bundled	4	2	3	3	4	3	3	3	2	2	0	-13	
Unbundled	3	4	4	7	2	1	1	1	1	0	-8	-29	
Service Revenue	6	4	7	5	3	3	3	2	2	2	-15	-9	
Total Factory Revenue	61	28	37	35	23	18	16	14	12	10	-22	-15	
Increase over Prior Year (%)	17	-54	34	-5	-36	-19	-14	-13	-13	-14			

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 45
Preliminary History and Forecast

Application: Electronic CAE
Region: Asia
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	334	430	540	640	760	870	NA	21
Unit Shipments or Seats	NA	NA	NA	NA	334	430	540	640	760	870	NA	21
CPU Installed Base	NA	NA	NA	NA	334	750	1,250	1,760	2,260	2,800	NA	53
Installed Seats	NA	NA	NA	NA	334	750	1,250	1,760	2,260	2,800	NA	53
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	102.1	92.9	89.4	85.7	82.2	78.9	NA	-5
Hardware-Only ASP	NA	NA	NA	NA	30.6	28.1	25.8	24.5	23.8	23.3	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	14	15	18	19	22	24	NA	12
CPU Revenue	NA	NA	NA	NA	9	10	12	14	16	18	NA	16
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	5	5	5	5	6	6	NA	3
Software Revenue	NA	NA	NA	NA	1	2	3	4	5	7	NA	37
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	53
Unbundled	NA	NA	NA	NA	1	2	3	4	5	7	NA	36
Service Revenue	NA	NA	NA	NA	4	5	6	7	8	9	NA	20
Total Factory Revenue	NA	NA	NA	NA	19	22	26	30	35	40	NA	16
Increase over Prior Year (%)	NA	NA	NA	NA	NA	18	18	15	17	14		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 46
Preliminary History and Forecast

Application:	Electronic CAE											
Region:	Asia											
Platform:	Personal Computer											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,273	3,018	5,044	6,991	7,156	5,890	5,730	4,760	3,930	3,210	22	-15
Unit Shipments or Seats	3,273	3,018	5,044	6,991	7,156	5,900	5,730	4,760	3,930	3,210	22	-15
CPU Installed Base	7,859	10,512	14,595	19,793	24,357	26,820	28,280	27,860	25,910	23,100	33	-1
Installed Seats	7,859	10,512	14,595	19,793	24,357	26,820	28,280	27,860	25,910	23,100	33	-1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.4	16.4	23.1	20.6	19.4	19.0	18.8	18.5	18.3	17.9	14	-2
Hardware-Only ASP	5.7	6.3	4.6	4.4	4.3	4.2	4.2	4.1	4.0	3.9	-7	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	19	21	41	43	47	35	30	23	17	13	26	-22
CPU Revenue	17	14	36	40	43	32	27	21	16	12	25	-22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	7	5	3	4	3	3	2	1	1	35	-24
Software Revenue	12	17	29	37	44	38	33	29	26	24	39	-11
Bundled	3	2	13	14	17	11	6	4	2	1	50	-44
Unbundled	8	15	16	23	27	27	27	26	24	23	34	-3
Service Revenue	1	2	7	7	9	8	7	6	5	5	60	-12
Total Factory Revenue	32	40	76	88	100	81	70	58	49	42	33	-16
Increase over Prior Year (%)	-47	26	91	15	14	-19	-14	-17	-16	-14		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 47
Preliminary History and Forecast

Application: Electronic CAE
Region: Rest of World
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	554	453	884	1,138	1,551	2,160	3,440	5,170	7,250	9,610	29	44
Unit Shipments or Seats	585	456	918	1,175	1,590	2,200	3,490	5,220	7,310	9,680	28	44
CPU Installed Base	1,389	1,779	2,516	3,375	4,501	6,090	8,780	12,940	18,780	26,380	34	42
Installed Seats	1,538	1,922	2,685	3,573	4,714	6,300	9,000	13,180	19,040	26,650	32	41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.2	24.9	58.7	47.9	62.2	58.0	55.6	54.1	47.3	45.9	-4	-6
Hardware-Only ASP	20.1	16.4	9.2	8.0	7.1	6.5	6.0	5.7	5.5	5.3	-23	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	12	8	9	10	12	14	21	30	41	52	-2	35
CPU Revenue	9	7	8	8	10	13	19	28	38	49	2	37
Terminal Revenue	1	1	1	1	1	1	1	1	1	2	-1	11
Peripheral Revenue (Turnkey)	2	1	1	1	1	1	1	1	1	2	-29	24
Software Revenue	2	4	3	5	6	7	9	10	10	11	25	15
Bundled	1	1	0	1	0	1	1	1	1	1	-16	28
Unbundled	1	3	3	4	5	7	8	9	9	10	38	14
Service Revenue	2	2	2	2	2	2	3	4	5	7	-6	32
Total Factory Revenue	17	14	14	16	19	24	34	45	57	70	3	30
Increase over Prior Year (%)	-37	-19	3	17	15	28	41	32	27	23		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 48

Preliminary History and Forecast

Application:	Electronic CAE											
Region:	Rest of World											
Platform:	Technical Workstation											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	163	175	56	60	55	70	90	110	130	150	-24	22
Unit Shipments or Seats	163	175	56	60	55	70	90	110	130	150	-24	22
CPU Installed Base	565	723	729	682	578	480	420	420	460	530	1	-2
Installed Seats	565	723	729	682	578	480	420	420	460	530	1	-2
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	55.9	20.9	55.2	46.7	53.0	50.6	48.5	47.1	45.9	44.9	-1	-3
Hardware-Only ASP	26.2	18.6	24.7	22.6	17.3	15.7	14.5	13.6	13.1	12.7	-10	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	4	3	2	1	1	1	2	2	2	3	-29	18
CPU Revenue	4	3	2	1	1	1	1	1	2	2	-32	17
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	1	0	0	0	0	0	1	1	1	1	-23	20
Software Revenue	1	2	1	1	2	3	4	5	5	6	16	27
Bundled	1	1	0	0	0	1	1	1	1	1	-11	31
Unbundled	0	1	0	1	2	2	3	4	4	5	36	26
Service Revenue	1	1	1	1	1	1	1	1	2	2	-11	27
Total Factory Revenue	6	6	3	4	4	5	7	8	9	11	-14	24
Increase over Prior Year (%)	-32	-10	-46	16	-2	36	40	19	16	13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 49
Preliminary History and Forecast

Application: Electronic CAE
Region: Rest of World
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4	25	30	34	10	10	10	20	20	20	25	15
Unit Shipments or Seats	34	28	65	70	48	50	60	70	80	90	9	13
CPU Installed Base	62	85	112	139	135	130	120	110	110	100	22	-6
Installed Seats	210	227	281	337	348	340	340	350	370	370	13	1
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	270.2	463.9	449.0	136.4	142.9	136.5	130.9	125.4	120.1	115.3	-15	-4
Hardware-Only ASP	55,555.6	118.7	98.0	90.4	228.9	208.4	191.3	175.4	160.6	147.7	-75	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	6	3	3	3	2	2	2	3	3	4	-22	11
CPU Revenue	4	2	2	2	1	1	1	2	2	2	-26	11
Terminal Revenue	1	1	1	1	1	1	1	1	1	2	-1	11
Peripheral Revenue (Turnkey)	1	0	0	0	0	0	0	0	0	0	-48	8
Software Revenue	0	1	0	0	0	0	0	0	0	0	1	-7
Bundled	0	0	0	0	0	0	0	0	0	0	-24	-13
Unbundled	0	1	0	0	0	0	0	0	0	0	9	-6
Service Revenue	1	1	1	1	0	0	1	1	1	1	-16	13
Total Factory Revenue	7	5	4	4	3	3	3	4	4	5	-20	10
Increase over Prior Year (%)	-51	-32	-18	0	-27	-9	22	18	12	8		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 50
Preliminary History and Forecast

Application: Electronic CAE
Region: Rest of World
Platform: Server

											CAGR (%) 1987-19	CAGR (%) 1991-19
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	91	96
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	32	50	60	90	120	160	NA	38
Unit Shipments or Seats	NA	NA	NA	NA	32	50	60	90	120	160	NA	38
CPU Installed Base	NA	NA	NA	NA	32	80	140	210	300	420	NA	67
Installed Seats	NA	NA	NA	NA	32	80	140	210	300	420	NA	67
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	81.1	77.5	74.3	71.2	68.2	65.5	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	30.5	27.8	25.5	24.2	23.5	23.0	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	1	1	2	2	3	4	NA	31
CPU Revenue	NA	NA	NA	NA	1	1	2	2	3	3	NA	31
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	0	NA	31
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	0	0	0	1	1	1	NA	34
Total Factory Revenue	NA	NA	NA	NA	1	2	2	3	4	5	NA	32
Increase over Prior Year (%)	NA	NA	NA	NA	NA	31	30	34	31	33		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 51
Preliminary History and Forecast

Application: Electronic CAE
Region: Rest of World
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	388	253	797	1,044	1,454	2,040	3,280	4,950	6,970	9,270	39	45
Unit Shipments or Seats	388	253	797	1,044	1,454	2,040	3,280	4,950	6,970	9,270	39	45
CPU Installed Base	763	972	1,675	2,554	3,756	5,410	8,110	12,200	17,910	25,320	49	46
Installed Seats	763	972	1,675	2,554	3,756	5,410	8,110	12,200	17,910	25,320	49	46
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	36.8	29.4	32.2	8.1	144.3	142.9	140.7	138.6	136.5	133.1	41	-2
Hardware-Only ASP	4.8	6.1	5.2	4.9	4.9	4.9	4.8	4.7	4.6	4.5	1	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	4	5	7	10	16	23	32	42	39	42
CPU Revenue	2	2	4	5	7	10	15	23	32	41	39	42
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	12	42
Software Revenue	1	1	2	3	3	4	5	5	5	5	38	7
Bundled	0	0	0	0	0	0	0	0	0	0	-49	-100
Unbundled	1	1	2	3	3	4	5	5	5	5	45	7
Service Revenue	0	0	0	0	0	1	1	1	2	3	25	53
Total Factory Revenue	3	3	7	9	11	15	21	30	39	49	38	35
Increase over Prior Year (%)	44	-8	142	28	27	34	46	38	31	27		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 52
Preliminary History and Forecast

Application: IC Layout
Region: Worldwide
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,172	5,250	7,556	9,245	11,051	15,830	20,480	25,600	31,810	39,160	28	29
Unit Shipments or Seats	4,536	5,278	7,656	9,260	11,094	15,840	20,490	25,610	31,820	39,160	25	29
CPU Installed Base	8,721	13,670	20,430	28,039	36,409	48,520	63,060	79,870	97,950	120,640	43	27
Installed Seats	10,191	14,985	21,594	28,935	37,101	49,070	63,450	80,130	98,120	120,750	38	27
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	79.1	84.4	70.3	58.6	55.3	52.3	50.5	48.9	47.8	46.8	-9	-3
Hardware-Only ASP	26.6	21.8	18.2	17.5	15.4	12.8	11.8	11.1	10.6	10.3	-13	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	137	143	163	190	196	231	270	310	363	424	9	17
CPU Revenue	94	109	147	174	180	215	253	293	345	405	18	18
Terminal Revenue	21	7	3	3	3	1	1	1	1	1	-39	-26
Peripheral Revenue (Turnkey)	23	28	12	13	14	15	16	17	18	19	-12	7
Software Revenue	166	159	167	185	198	207	244	285	325	368	5	13
Bundled	36	35	35	38	33	33	35	35	34	33	-3	0
Unbundled	129	124	132	147	165	174	208	250	291	335	6	15
Service Revenue	34	54	65	82	80	87	105	124	148	177	24	17
Total Factory Revenue	337	356	394	457	475	526	618	720	836	969	9	15
Increase over Prior Year (%)	22	6	11	16	4	11	18	16	16	16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 53
Preliminary History and Forecast

Application: IC Layout
 Region: Worldwide
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	2,339	3,320	6,130	7,950	9,765	14,300	18,770	23,670	29,580	36,510	43	30
Unit Shipments or Seats	2,339	3,320	6,130	7,950	9,765	14,300	18,770	23,670	29,580	36,510	43	30
CPU Installed Base	5,476	8,610	14,253	21,221	29,326	41,090	55,200	71,490	89,020	110,870	52	30
Installed Seats	5,476	8,610	14,253	21,221	29,326	41,090	55,200	71,490	89,020	110,870	52	30
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	93.0	100.4	66.4	58.5	55.0	52.6	50.4	48.9	47.7	46.6	-12	-3
Hardware-Only ASP	22.0	18.1	14.4	14.8	12.5	11.2	10.4	9.8	9.4	9.1	-13	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	71	91	110	145	146	186	222	258	305	357	20	20
CPU Revenue	56	67	101	135	137	176	210	246	292	344	25	20
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	16	24	8	10	9	10	11	12	12	13	-12	7
Software Revenue	127	135	142	166	178	191	226	266	305	346	9	14
Bundled	31	34	32	36	31	33	34	34	34	33	0	1
Unbundled	96	101	111	130	147	158	192	232	271	313	11	16
Service Revenue	24	39	50	68	64	74	91	109	131	157	29	19
Total Factory Revenue	222	264	302	379	388	451	538	633	740	860	15	17
Increase over Prior Year (%)	32	19	14	26	2	16	19	18	17	16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 54
Preliminary History and Forecast

Application:	IC Layout											
Region:	Worldwide											
Platform:	Host-Dependent											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	94	510	938	953	214	120	110	90	80	60	23	-22
Unit Shipments or Seats	459	537	1,039	968	257	130	120	100	80	70	-13	-23
CPU Installed Base	849	1,282	2,102	2,898	2,924	2,870	2,720	2,360	1,810	1,220	36	-16
Installed Seats	2,319	2,596	3,266	3,794	3,617	3,420	3,110	2,620	1,980	1,330	12	-18
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	375.5	212.4	604.1	83.8	78.9	74.1	71.5	68.3	65.5	62.7	-32	-4
Hardware-Only ASP	1,451.8	81.5	45.3	42.0	149.2	137.1	126.2	115.5	105.6	97.5	-43	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	58	44	49	42	24	11	9	8	6	5	-20	-26
CPU Revenue	30	33	43	36	19	9	8	6	5	4	-11	-26
Terminal Revenue	21	7	3	3	3	1	1	1	1	1	-39	-26
Peripheral Revenue (Turnkey)	7	4	3	3	2	1	1	1	0	0	-27	-28
Software Revenue	23	20	22	17	13	10	10	9	9	9	-14	-7
Bundled	5	0	3	1	2	1	1	1	0	0	-21	-29
Unbundled	19	20	19	16	11	9	9	9	9	9	-13	-4
Service Revenue	9	15	15	14	10	6	5	5	5	5	1	-14
Total Factory Revenue	91	79	86	73	46	27	24	22	20	19	-16	-17
Increase over Prior Year (%)	-11	-13	10	-15	-38	-42	-9	-9	-8	-9		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 55
Preliminary History and Forecast

Application: IC Layout
Region: Worldwide
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	676	1,010	1,290	1,600	1,970	2,450	NA	29
Unit Shipments or Seats	NA	NA	NA	NA	676	1,010	1,290	1,600	1,970	2,450	NA	29
CPU Installed Base	NA	NA	NA	NA	676	1,670	2,850	4,170	5,540	7,210	NA	61
Installed Seats	NA	NA	NA	NA	676	1,670	2,850	4,170	5,540	7,210	NA	61
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	34.8	31.0	28.4	26.8	25.9	25.2	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	24	31	37	43	51	62	NA	21
CPU Revenue	NA	NA	NA	NA	21	28	33	39	46	56	NA	21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	2	3	3	4	5	6	NA	20
Software Revenue	NA	NA	NA	NA	6	6	7	10	11	13	NA	15
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	6	6	7	10	11	13	NA	15
Service Revenue	NA	NA	NA	NA	6	7	8	10	12	15	NA	21
Total Factory Revenue	NA	NA	NA	NA	36	44	52	62	75	90	NA	20
Increase over Prior Year (%)	NA	NA	NA	NA	NA	22	20	19	20	20		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 56
Preliminary History and Forecast

Application:	IC Layout											
Region:	Worldwide											
Platform:	Personal Computer											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,739	1,420	487	342	396	410	310	240	180	130	-31	-20
Unit Shipments or Seats	1,739	1,420	487	342	396	410	310	240	180	130	-31	-20
CPU Installed Base	2,396	3,778	4,075	3,920	3,482	2,890	2,280	1,860	1,580	1,340	10	-17
Installed Seats	2,396	3,778	4,075	3,920	3,482	2,890	2,280	1,860	1,580	1,340	10	-17
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	6.0	15.6	23.6	27.0	29.1	27.4	26.8	26.6	26.2	24.7	48	-3
Hardware-Only ASP	5.0	5.0	3.7	3.1	3.1	3.1	3.0	3.0	2.9	2.9	-11	-1
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	8	9	4	3	3	3	2	2	1	1	-22	-29
CPU Revenue	8	8	3	2	3	3	2	1	1	0	-23	-30
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-5	-27
Software Revenue	16	5	3	1	1	1	1	0	0	0	-46	-41
Bundled	1	1	0	0	0	0	0	0	0	0	-67	-100
Unbundled	15	4	2	1	1	1	1	0	0	0	-46	-41
Service Revenue	1	0	0	0	0	1	0	0	0	0	-28	-11
Total Factory Revenue	25	14	6	4	5	5	3	2	2	1	-34	-30
Increase over Prior Year (%)	266	-45	-53	-36	13	-2	-32	-28	-33	-47		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 57
Preliminary History and Forecast

Application: IC Layout
Region: North America
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,804	2,470	3,950	4,682	5,909	8,490	10,400	12,410	15,200	19,160	35	27
Unit Shipments or Seats	1,961	2,467	3,956	4,693	5,933	8,500	10,410	12,420	15,200	19,160	32	26
CPU Installed Base	4,828	7,070	10,495	14,218	18,685	25,290	32,700	40,610	48,720	59,480	40	26
Installed Seats	5,633	7,705	10,934	14,469	18,831	25,420	32,790	40,680	48,770	59,510	35	26
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	64.8	64.7	52.0	54.6	54.3	51.9	49.9	48.5	47.3	46.2	-4	-3
Hardware-Only ASP	26.0	22.3	17.9	16.6	14.2	12.2	11.2	10.5	10.2	9.9	-14	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	51	59	74	83	90	109	123	138	162	197	15	17
CPU Revenue	34	46	69	77	83	103	117	131	154	188	25	18
Terminal Revenue	8	3	1	2	2	1	1	1	0	0	-32	-25
Peripheral Revenue (Turnkey)	10	10	4	4	5	5	6	7	8	9	-16	14
Software Revenue	91	65	71	75	68	67	77	90	106	128	-7	14
Bundled	7	9	10	14	11	11	12	13	13	14	11	5
Unbundled	83	57	61	61	57	56	66	77	92	114	-9	15
Service Revenue	16	23	32	43	40	43	51	59	71	88	25	17
Total Factory Revenue	158	148	177	201	198	219	251	287	339	414	6	16
Increase over Prior Year (%)	2	-6	20	14	-2	11	15	14	18	22		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (May 1992)

Table 58
Preliminary History and Forecast

Application:	IC Layout											
Region:	North America											
Platform:	Technical Workstation											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,203	1,631	3,183	3,948	5,144	7,520	9,360	11,270	13,890	17,580	44	28
Unit Shipments or Seats	1,203	1,631	3,183	3,948	5,144	7,520	9,360	11,270	13,890	17,580	44	28
CPU Installed Base	3,180	4,683	7,554	10,909	15,116	21,290	28,240	35,740	43,490	53,710	48	29
Installed Seats	3,180	4,683	7,554	10,909	15,116	21,290	28,240	35,740	43,490	53,710	48	29
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	62.7	62.5	51.9	54.8	54.6	52.1	50.0	48.5	47.3	46.2	-3	-3
Hardware-Only ASP	21.1	18.8	15.0	14.5	11.5	10.4	9.6	9.0	8.7	8.5	-14	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	30	34	52	64	66	85	97	110	129	157	22	19
CPU Revenue	22	27	49	61	64	83	94	107	126	153	30	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	7	8	3	3	2	3	3	3	4	4	-24	11
Software Revenue	69	55	59	67	61	61	73	86	103	126	-3	16
Bundled	7	9	10	14	11	10	12	13	13	14	13	5
Unbundled	63	46	49	53	50	50	61	74	90	112	-6	18
Service Revenue	12	16	25	36	33	36	44	52	63	79	29	19
Total Factory Revenue	111	105	136	167	160	183	215	248	296	363	10	18
Increase over Prior Year (%)	16	-5	29	23	-4	14	18	16	19	22		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 59
Preliminary History and Forecast

Application: IC Layout
Region: North America
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	20	262	494	480	60	30	30	20	20	20	32	-20
Unit Shipments or Seats	177	259	500	491	84	40	30	30	20	20	-17	-25
CPU Installed Base	465	658	1,059	1,439	1,390	1,350	1,260	1,070	780	500	32	-18
Installed Seats	1,270	1,292	1,498	1,690	1,536	1,480	1,360	1,140	840	540	5	-19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	130.3	183.0	NA	94.0	70.5	67.3	64.6	61.9	59.3	56.9	-14	-4
Hardware-Only ASP	3,575.1	79.1	41.9	38.5	152.0	138.4	127.0	116.5	106.6	98.1	-55	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	18	22	21	19	9	4	3	3	2	2	-17	-24
CPU Revenue	8	16	18	15	7	3	3	2	2	2	-6	-24
Terminal Revenue	8	3	1	2	2	1	1	1	0	0	-32	-25
Peripheral Revenue (Turnkey)	2	2	1	1	0	0	0	0	0	0	-31	-24
Software Revenue	11	9	11	7	6	5	4	3	2	2	-13	-22
Bundled	1	0	0	0	0	0	0	0	0	0	-14	-51
Unbundled	11	8	11	7	6	5	4	3	2	2	-13	-21
Service Revenue	4	7	7	7	5	3	2	2	2	1	4	-21
Total Factory Revenue	33	37	39	32	20	12	9	8	6	5	-12	-23
Increase over Prior Year (%)	-39	12	4	-16	-39	-38	-22	-18	-17	-16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 60

Preliminary History and Forecast

Application: IC Layout
 Region: North America
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	403	600	760	920	1,130	1,450	NA	29
Unit Shipments or Seats	NA	NA	NA	NA	403	600	760	920	1,130	1,450	NA	29
CPU Installed Base	NA	NA	NA	NA	403	1,000	1,690	2,440	3,220	4,200	NA	60
Installed Seats	NA	NA	NA	NA	403	1,000	1,690	2,440	3,220	4,200	NA	60
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	34.1	31.0	28.5	27.1	26.3	25.7	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	14	19	22	25	30	37	NA	22
CPU Revenue	NA	NA	NA	NA	12	16	19	22	26	32	NA	22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	2	2	3	3	4	5	NA	22
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	2	3	4	5	6	8	NA	27
Total Factory Revenue	NA	NA	NA	NA	16	22	26	30	36	45	NA	23
Increase over Prior Year (%)	NA	NA	NA	NA	NA	38	15	16	21	26		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 61
Preliminary History and Forecast

Application: IC Layout
Region: North America
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	581	577	273	254	302	330	260	200	160	120	-15	-17
Unit Shipments or Seats	581	577	273	254	302	330	260	200	160	120	-15	-17
CPU Installed Base	1,183	1,729	1,882	1,870	1,776	1,650	1,500	1,360	1,220	1,070	11	-10
Installed Seats	1,183	1,729	1,882	1,870	1,776	1,650	1,500	1,360	1,220	1,070	11	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	32.7	25.8	49.0	24.7	24.7	24.5	24.1	23.7	23.4	22.8	-7	-2
Hardware-Only ASP	5.0	5.3	3.5	3.1	3.1	3.1	3.0	3.0	2.9	2.9	-11	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	3	1	1	1	1	1	1	0	0	-24	-20
CPU Revenue	3	3	1	1	1	1	1	1	0	0	-25	-20
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-4	-17
Software Revenue	10	2	1	1	1	1	1	0	0	0	-45	-38
Bundled	0	0	0	0	0	0	0	0	0	0	-51	-100
Unbundled	10	2	1	1	1	1	1	0	0	0	-44	-38
Service Revenue	1	0	0	0	0	0	0	0	0	0	-39	-24
Total Factory Revenue	14	5	2	2	2	2	2	1	1	0	-38	-26
Increase over Prior Year (%)	190	-62	-59	-17	18	-1	-26	-36	-32	-32		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 62
Preliminary History and Forecast

Application:	IC Layout												
Region:	Europe												
Platform:	All Platforms												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996	
HARDWARE SHIPMENT DATA													
CPU Shipments	1,231	1,443	1,845	2,255	2,468	2,860	4,180	5,640	7,150	8,440	19	28	
Unit Shipments or Seats	1,290	1,451	1,820	2,244	2,468	2,860	4,180	5,640	7,150	8,440	18	28	
CPU Installed Base	1,905	3,311	5,017	6,930	8,776	10,730	13,490	17,090	21,210	26,050	47	24	
Installed Seats	2,055	3,465	5,141	7,035	8,860	10,780	13,510	17,090	21,210	26,050	44	24	
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)													
Turnkey ASP	30.1	60.1	53.0	54.9	56.3	53.4	51.2	49.6	48.5	47.3	17	-3	
Hardware-Only ASP	24.5	24.6	20.7	20.9	19.4	15.7	14.1	13.0	12.4	11.9	-6	-9	
REVENUE DATA (Millions of U.S. Dollars)													
Hardware Revenue	27	39	40	49	50	48	62	76	91	104	16	16	
CPU Revenue	19	32	38	46	47	46	60	74	89	101	25	17	
Terminal Revenue	3	2	1	1	1	0	0	0	0	0	-27	-47	
Peripheral Revenue (Turnkey)	5	5	2	2	2	2	2	2	2	2	-20	5	
Software Revenue	37	31	29	31	34	34	37	40	43	47	-2	7	
Bundled	5	5	4	6	6	6	6	6	6	6	1	3	
Unbundled	31	26	25	25	29	29	31	34	37	41	-2	7	
Service Revenue	8	14	15	22	22	22	26	30	35	40	28	13	
Total Factory Revenue	73	84	84	102	106	104	125	146	170	191	10	12	
Increase over Prior Year (%)	73	16	-1	22	4	-2	20	17	16	13			

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 63

Preliminary History and Forecast

Application: IC Layout
 Region: Europe
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	424	794	1,523	1,973	2,235	2,660	3,930	5,340	6,810	8,060	52	29
Unit Shipments or Seats	424	794	1,523	1,973	2,235	2,660	3,930	5,340	6,810	8,060	52	29
CPU Installed Base	946	1,712	3,155	4,957	6,880	9,010	11,910	15,560	19,700	24,500	64	29
Installed Seats	946	1,712	3,155	4,957	6,880	9,010	11,910	15,560	19,700	24,500	64	29
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	77.6	69.8	54.4	54.9	55.9	53.4	51.2	49.7	48.5	47.3	-8	-3
Hardware-Only ASP	21.7	21.4	15.6	16.8	15.0	13.6	12.5	11.7	11.3	10.9	-9	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	13	20	26	36	36	39	52	66	80	91	30	20
CPU Revenue	9	16	25	35	35	38	51	64	78	90	41	21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	4	1	1	1	1	1	1	2	2	-27	10
Software Revenue	29	27	25	29	31	31	33	35	38	42	2	6
Bundled	5	5	4	6	5	6	6	6	6	6	1	4
Unbundled	24	22	22	23	26	26	27	29	32	36	2	7
Service Revenue	6	9	11	18	17	19	22	26	30	35	32	15
Total Factory Revenue	47	56	63	83	85	89	107	127	148	168	16	15
Increase over Prior Year (%)	91	19	11	32	3	5	21	18	17	13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 64

Preliminary History and Forecast

Application: IC Layout
 Region: Europe
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	15	169	244	260	49	10	10	10	10	0	34	-100
Unit Shipments or Seats	74	177	219	249	50	10	10	10	10	0	-9	-100
CPU Installed Base	119	286	522	765	788	760	700	580	420	260	60	-20
Installed Seats	269	440	645	869	872	810	720	580	420	260	34	-21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	236.1	244.7	NA	157.9	76.3	37.4	42.3	26.3	.0	.0	-25	-100
Hardware-Only ASP	1,247.5	89.0	53.4	49.6	143.8	131.0	121.8	111.0	98.6	91.2	-42	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	12	16	13	13	7	1	1	1	1	0	-13	-46
CPU Revenue	7	13	12	11	5	1	1	1	0	0	-8	-45
Terminal Revenue	3	2	1	1	1	0	0	0	0	0	-27	-47
Peripheral Revenue (Turnkey)	1	1	1	1	0	0	0	0	0	0	-17	-100
Software Revenue	7	3	2	2	3	3	4	5	5	5	-19	13
Bundled	0	0	0	0	0	0	0	0	0	0	10	-100
Unbundled	6	3	2	2	3	3	4	5	5	5	-20	15
Service Revenue	2	6	4	4	3	1	1	2	2	2	7	-9
Total Factory Revenue	20	25	19	19	13	6	6	7	7	7	-11	-10
Increase over Prior Year (%)	26	22	-22	-0	-35	-56	11	13	7	-2		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 65
Preliminary History and Forecast

Application: IC Layout
Region: Europe
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	157	190	240	290	330	370	NA	19
Unit Shipments or Seats	NA	NA	NA	NA	157	190	240	290	330	370	NA	19
CPU Installed Base	NA	NA	NA	NA	157	340	560	790	1,010	1,230	NA	51
Installed Seats	NA	NA	NA	NA	157	340	560	790	1,010	1,230	NA	51
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	42.0	38.5	35.4	33.7	32.6	32.0	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	7	7	9	10	11	12	NA	13
CPU Revenue	NA	NA	NA	NA	6	7	8	9	10	11	NA	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	1	1	1	1	NA	12
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	2	2	2	3	3	4	NA	16
Total Factory Revenue	NA	NA	NA	NA	8	9	11	12	14	15	NA	13
Increase over Prior Year (%)	NA	NA	NA	NA	NA	11	19	14	12	11		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 66
Preliminary History and Forecast

Application: IC Layout
Region: Europe
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	792	480	78	23	27	0	0	0	0	0	-57	-100
Unit Shipments or Seats	792	480	78	23	27	0	0	0	0	0	-57	-100
CPU Installed Base	839	1,313	1,341	1,208	951	620	320	150	90	70	3	-41
Installed Seats	839	1,313	1,341	1,208	951	620	320	150	90	70	3	-41
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	2.8	6.5	33.7	25.0	175.0	.0	.0	.0	.0	.0	181	-100
Hardware-Only ASP	5.0	4.7	3.7	3.2	3.0	.0	.0	.0	.0	.0	-12	-100
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	3	2	1	0	0	0	0	0	0	0	-53	-100
CPU Revenue	3	2	1	0	0	0	0	0	0	0	-54	-100
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	NA	0	0	0	0	0	0	0	0	-36	-100
Software Revenue	2	1	1	0	0	0	0	0	0	0	-45	-100
Bundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	2	1	1	0	0	0	0	0	0	0	-43	-100
Service Revenue	0	NA	0	0	0	0	0	0	0	0	-56	43
Total Factory Revenue	5	3	2	0	0	0	0	0	0	0	-50	-28
Increase over Prior Year (%)	296	-37	-42	-88	45	-38	-40	-25	-22	-14		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 67
Preliminary History and Forecast

Application: IC Layout
Region: Asia
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,069	1,270	1,730	2,263	2,618	4,420	5,830	7,470	9,360	11,440	25	34
Unit Shipments or Seats	1,214	1,290	1,846	2,277	2,633	4,430	5,830	7,470	9,360	11,440	21	34
CPU Installed Base	1,829	3,065	4,672	6,631	8,678	12,230	16,580	21,850	27,660	34,700	48	32
Installed Seats	2,340	3,584	5,267	7,161	9,129	12,580	16,850	22,030	27,780	34,770	41	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	148.2	108.4	88.4	62.0	55.5	52.2	50.7	49.1	47.9	47.0	-22	-3
Hardware-Only ASP	29.7	15.3	15.3	14.6	13.8	12.0	11.0	10.3	9.9	9.6	-17	-7
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	57	43	48	57	55	73	84	94	108	122	-1	17
CPU Revenue	39	29	40	50	48	65	76	87	100	114	6	19
Terminal Revenue	10	1	1	0	0	0	0	0	0	0	-57	-13
Peripheral Revenue (Turnkey)	8	13	7	7	7	8	8	8	7	7	-4	1
Software Revenue	38	62	67	78	95	106	129	155	174	188	26	15
Bundled	23	21	21	18	16	17	18	16	15	13	-9	-5
Unbundled	14	41	46	61	80	89	111	139	160	176	53	17
Service Revenue	9	16	18	17	18	22	28	34	41	48	19	22
Total Factory Revenue	104	121	132	152	169	201	240	284	323	358	13	16
Increase over Prior Year (%)	44	17	9	15	11	19	19	18	14	11		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 68

Preliminary History and Forecast

Application: IC Layout
 Region: Asia
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	703	863	1,415	2,008	2,353	4,080	5,440	7,010	8,820	10,800	35	36
Unit Shipments or Seats	703	863	1,415	2,008	2,353	4,080	5,440	7,010	8,820	10,800	35	36
CPU Installed Base	1,269	2,103	3,430	5,236	7,204	10,660	14,900	20,010	25,620	32,420	54	35
Installed Seats	1,269	2,103	3,430	5,236	7,204	10,660	14,900	20,010	25,620	32,420	54	35
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	129.6	148.1	82.9	62.4	55.1	52.6	50.5	49.0	47.7	46.7	-19	-3
Hardware-Only ASP	24.4	12.7	11.0	12.8	12.2	11.0	10.2	9.5	9.2	8.9	-16	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	29	35	31	45	43	61	72	82	95	108	11	20
CPU Revenue	24	23	27	39	38	55	65	75	88	101	12	22
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	12	4	6	6	7	7	7	7	7	7	4
Software Revenue	29	52	58	70	86	98	119	144	161	174	32	15
Bundled	19	21	18	16	15	16	17	16	14	12	-6	-4
Unbundled	10	32	41	54	71	82	102	128	147	162	64	18
Service Revenue	6	14	13	14	14	19	24	31	37	43	25	25
Total Factory Revenue	63	101	103	129	143	179	215	257	293	325	23	18
Increase over Prior Year (%)	41	61	1	26	11	25	20	19	14	11		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 69

Preliminary History and Forecast

Application: IC Layout
 Region: Asia
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	55	68	183	190	101	70	70	60	40	40	17	-17
Unit Shipments or Seats	199	89	299	204	116	80	70	60	40	40	-13	-19
CPU Installed Base	242	305	471	625	677	700	700	660	560	430	29	-9
Installed Seats	753	825	1,066	1,155	1,128	1,050	960	840	680	500	11	-15
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	478.2	216.0	598.6	83.6	79.2	74.9	71.8	68.8	65.8	63.1	-36	-4
Hardware-Only ASP	959.6	65.9	42.2	37.7	155.0	137.0	125.6	114.4	105.2	96.1	-37	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	26	5	15	10	8	5	5	4	3	2	-27	-22
CPU Revenue	13	3	12	9	6	4	4	3	2	2	-16	-22
Terminal Revenue	10	1	1	0	0	0	0	0	0	0	-57	-13
Peripheral Revenue (Turnkey)	4	0	2	1	1	1	1	0	0	0	-28	-25
Software Revenue	5	8	8	8	3	2	2	2	2	2	-12	-11
Bundled	4	0	3	1	1	1	1	1	0	0	-26	-22
Unbundled	1	8	5	6	2	1	1	1	1	1	8	-6
Service Revenue	3	2	4	3	2	1	1	1	1	1	-12	-9
Total Factory Revenue	35	15	27	20	13	9	8	7	6	5	-22	-17
Increase over Prior Year (%)	30	-57	82	-25	-38	-33	-4	-16	-15	-13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 70
Preliminary History and Forecast

Application:	IC Layout											
Region:	Asia											
Platform:	Server											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	97	190	270	360	470	590	NA	44
Unit Shipments or Seats	NA	NA	NA	NA	97	190	270	360	470	590	NA	44
CPU Installed Base	NA	NA	NA	NA	97	290	540	850	1,210	1,640	NA	76
Installed Seats	NA	NA	NA	NA	97	290	540	850	1,210	1,640	NA	76
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	26.3	23.8	21.9	20.8	20.2	19.8	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	3	5	6	8	9	12	NA	36
CPU Revenue	NA	NA	NA	NA	3	5	6	7	9	12	NA	36
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	0	NA	36
Software Revenue	NA	NA	NA	NA	6	6	7	10	11	13	NA	15
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	6	6	7	10	11	13	NA	15
Service Revenue	NA	NA	NA	NA	2	1	2	2	3	4	NA	16
Total Factory Revenue	NA	NA	NA	NA	11	12	15	19	24	28	NA	22
Increase over Prior Year (%)	NA	NA	NA	NA	NA	10	30	29	23	18		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 71
Preliminary History and Forecast

Application: IC Layout
Region: Asia
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	311	339	132	65	67	70	50	40	20	10	-32	-32
Unit Shipments or Seats	311	339	132	65	67	70	50	40	20	10	-32	-32
CPU Installed Base	318	656	770	770	701	590	440	340	270	210	22	-21
Installed Seats	318	656	770	770	701	590	440	340	270	210	22	-21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	15.1	18.3	20.1	27.2	28.1	27.5	27.0	26.7	26.3	25.3	17	-2
Hardware-Only ASP	5.0	5.0	4.4	NA	.0	.0	.0	.0	.0	.0	-100	NA
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	3	2	2	2	2	1	1	1	0	1	-35
CPU Revenue	2	3	2	2	2	2	1	1	1	0	1	-36
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	0	-33
Software Revenue	4	2	0	0	0	0	0	0	0	0	-54	-100
Bundled	1	1	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	3	1	0	0	0	0	0	0	0	0	-52	-100
Service Revenue	0	0	0	0	0	0	0	0	0	0	-2	-18
Total Factory Revenue	6	5	2	2	2	2	1	1	1	0	-21	-34
Increase over Prior Year (%)	651	-12	-53	-11	5	2	-37	-19	-35	-63		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 72
Preliminary History and Forecast

Application:	IC Layout										CAGR (%)	CAGR (%)
Region:	Rest of World										1987-1991	1991-1996
Platform:	All Platforms											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996		
HARDWARE SHIPMENT DATA												
CPU Shipments	68	67	31	44	56	60	70	80	100	120	-5	16
Unit Shipments or Seats	72	70	35	47	59	60	70	80	100	120	-5	15
CPU Installed Base	161	225	245	260	269	270	290	320	360	410	14	9
Installed Seats	164	231	253	270	281	290	300	330	370	420	15	8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	60.7	86.8	55.7	22.7	130.4	.0	.0	.0	.0	.0	21	-100
Hardware-Only ASP	35.1	29.4	42.7	31.7	26.6	20.1	18.5	17.2	16.5	15.8	-7	-10
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	2	1	1	2	1	1	1	2	2	-11	5
CPU Revenue	2	2	1	1	1	1	1	1	1	2	-11	5
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-23	-7
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	5	9
Software Revenue	0	0	0	0	0	0	0	1	2	4	-23	86
Bundled	0	0	0	NA	0	0	0	0	0	0	-44	-100
Unbundled	0	0	0	0	0	0	0	1	2	4	-19	89
Service Revenue	0	1	0	0	0	0	0	0	1	1	19	13
Total Factory Revenue	3	3	2	2	2	2	2	3	4	6	-10	25
Increase over Prior Year (%)	-58	2	-43	8	5	-15	23	31	42	55		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 73
Preliminary History and Forecast

Application: IC Layout
Region: Rest of World
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	9	32	10	22	33	40	40	50	60	70	40	16
Unit Shipments or Seats	9	32	10	22	33	40	40	50	60	70	40	16
CPU Installed Base	82	112	114	118	126	130	150	180	210	240	11	14
Installed Seats	82	112	114	118	126	130	150	180	210	240	11	14
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	53.9	77.4	40.8	26.3	.0	.0	.0	.0	.0	.0	-100	NA
Hardware-Only ASP	33.6	18.2	22.8	17.0	7.9	7.2	6.6	6.2	6.0	5.8	-30	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	1	0	0	0	0	0	0	0	0	-5	10
CPU Revenue	0	1	0	0	0	0	0	0	0	0	-6	10
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	0	12
Software Revenue	0	0	0	0	0	0	0	1	2	4	-15	100
Bundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Unbundled	0	0	0	0	0	0	0	1	2	4	-2	100
Service Revenue	0	0	0	0	0	0	0	0	0	0	9	27
Total Factory Revenue	1	1	0	1	0	1	1	1	2	4	-7	57
Increase over Prior Year (%)	-79	98	-70	79	-28	20	51	61	75	85		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 74
Preliminary History and Forecast

Application:	IC Layout											
Region:	Rest of World											
Platform:	Host-Dependent											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4	10	17	22	4	0	0	0	0	0	-4	-100
Unit Shipments or Seats	8	13	21	24	7	0	0	0	0	10	-4	8
CPU Installed Base	24	33	50	70	70	60	60	50	40	30	31	-15
Installed Seats	27	39	57	80	82	80	70	60	50	40	32	-13
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	187.5	208.3	529.4	NA	.0	.0	.0	.0	.0	.0	-100	NA
Hardware-Only ASP	452.5	122.6	57.3	46.1	159.9	145.6	133.6	122.5	112.2	103.2	-23	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	2	1	1	1	1	0	0	0	0	0	-25	-7
CPU Revenue	1	1	1	1	0	0	0	0	0	0	-26	-7
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	-23	-7
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-26	-8
Software Revenue	0	0	0	0	0	0	0	0	0	0	-25	0
Bundled	0	NA	NA	NA	0	0	0	0	0	0	0	-100
Unbundled	0	0	0	0	0	0	0	0	0	0	-28	5
Service Revenue	0	0	0	0	0	0	0	0	0	0	8	1
Total Factory Revenue	2	2	1	1	1	0	1	1	1	1	-22	-5
Increase over Prior Year (%)	-53	-16	-25	-4	-38	-43	9	10	7	8		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 75
Preliminary History and Forecast

Application: IC Layout
Region: Rest of World
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	19	20	20	30	40	40	NA	16
Unit Shipments or Seats	NA	NA	NA	NA	19	20	20	30	40	40	NA	16
CPU Installed Base	NA	NA	NA	NA	19	40	60	80	110	130	NA	46
Installed Seats	NA	NA	NA	NA	19	40	60	80	110	130	NA	46
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	NA	NA	NA	NA	33.1	30.1	27.7	26.3	25.5	25.0	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	1	1	1	1	1	1	NA	11
CPU Revenue	NA	NA	NA	NA	1	1	1	1	1	1	NA	11
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	0	0	NA	11
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	15
Total Factory Revenue	NA	NA	NA	NA	1	1	1	1	1	1	NA	11
Increase over Prior Year (%)	NA	NA	NA	NA	NA	-3	12	13	17	18		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.
Source: Dataquest (May 1992)

Table 76
Preliminary History and Forecast

Application: IC Layout
Region: Rest of World
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	55	25	4	NA	0	0	0	0	0	0	-100	NA
Unit Shipments or Seats	55	25	4	NA	0	0	0	0	0	0	-100	NA
CPU Installed Base	55	80	82	72	54	30	20	10	0	0	-0	-100
Installed Seats	55	80	82	72	54	30	20	10	0	0	-0	-100
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	25.1	NA	.0	.0	.0	.0	.0	.0	NA	NA
Hardware-Only ASP	4.9	6.0	5.5	NA	.0	.0	.0	.0	.0	.0	-100	NA
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	0	0	0	NA	0	0	0	0	0	0	-42	-100
CPU Revenue	0	0	0	NA	0	0	0	0	0	0	-42	-100
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	0	NA	0	0	0	0	0	0	NA	NA
Software Revenue	0	0	0	0	0	0	0	0	0	0	-100	NA
Bundled	NA	NA	0	NA	0	0	0	0	0	0	NA	NA
Unbundled	0	0	0	0	0	0	0	0	0	0	-100	NA
Service Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Total Factory Revenue	0	0	0	0	0	0	0	0	0	0	-46	-20
Increase over Prior Year (%)	NA	-49	-44	-80	50	-67	0	0	0	0		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 77
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Worldwide
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	21,096	28,965	23,147	25,194	27,577	28,780	30,870	35,030	39,290	43,950	7	10
Unit Shipments or Seats	22,947	29,964	25,228	27,205	29,717	30,700	32,460	36,180	40,040	44,360	7	8
CPU Installed Base	38,814	66,425	85,773	102,649	116,417	126,660	135,020	144,520	154,320	167,390	32	8
Installed Seats	45,233	73,529	94,425	112,482	127,190	137,880	146,240	155,040	163,440	174,460	29	7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.2	80.9	55.1	56.5	52.4	51.3	53.0	53.0	53.1	52.8	-8	0
Hardware-Only ASP	11.2	9.6	16.4	14.9	13.8	13.4	13.0	12.5	12.2	12.0	5	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	427	510	523	532	528	527	537	578	626	674	5	5
CPU Revenue	292	385	415	426	409	412	432	475	525	579	9	7
Terminal Revenue	69	40	44	43	42	40	34	26	18	10	-12	-25
Peripheral Revenue (Turnkey)	66	85	63	63	77	75	71	76	83	85	4	2
Software Revenue	270	295	304	325	349	378	406	454	506	555	7	10
Bundled	125	151	182	179	171	180	175	186	200	207	8	4
Unbundled	145	145	121	146	179	197	231	267	306	348	5	14
Service Revenue	110	126	135	162	166	183	208	240	276	317	11	14
Total Factory Revenue	807	931	962	1,019	1,044	1,087	1,152	1,271	1,408	1,546	7	8
Increase over Prior Year (%)	25	15	3	6	2	4	6	10	11	10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 78

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,809	6,120	10,962	12,005	12,770	14,860	18,640	23,910	29,600	35,620	35	23
Unit Shipments or Seats	3,809	6,120	10,962	12,005	12,770	14,860	18,640	23,910	29,600	35,620	35	23
CPU Installed Base	9,257	15,032	25,140	35,454	45,377	55,860	67,120	80,240	94,270	112,610	49	20
Installed Seats	9,257	15,032	25,140	35,454	45,377	55,860	67,120	80,240	94,270	112,610	49	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	93.8	79.5	62.0	61.7	62.8	59.6	56.8	55.1	53.8	52.6	-10	-3
Hardware-Only ASP	23.9	20.2	15.2	15.2	13.0	11.7	10.8	10.2	10.0	9.8	-14	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	179	233	289	304	295	302	328	382	445	501	13	11
CPU Revenue	138	177	241	259	232	241	270	318	374	429	14	13
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	41	55	47	45	63	61	58	64	71	73	11	3
Software Revenue	154	193	234	259	274	304	342	397	457	513	16	13
Bundled	88	111	160	156	142	150	154	170	189	198	13	7
Unbundled	66	82	74	103	132	154	189	227	268	314	19	19
Service Revenue	59	76	91	121	119	134	158	189	225	262	19	17
Total Factory Revenue	391	502	613	684	688	740	828	968	1,126	1,276	15	13
Increase over Prior Year (%)	41	28	22	12	1	8	12	17	16	13		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 79
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Worldwide
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	380	879	1,208	1,261	701	670	570	460	330	210	17	-21
Unit Shipments or Seats	2,232	1,878	3,289	3,272	2,841	2,590	2,160	1,610	1,080	630	6	-26
CPU Installed Base	2,174	2,916	3,888	4,789	5,022	5,170	5,130	4,770	4,070	3,100	23	-9
Installed Seats	8,593	10,019	12,540	14,622	15,795	16,390	16,350	15,290	13,180	10,170	16	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	338.7	463.2	437.2	178.8	148.4	157.6	165.4	151.6	126.3	99.0	-19	-8
Hardware-Only ASP	1,608.3	107.4	111.5	118.0	230.3	212.1	195.2	179.1	164.5	150.6	-38	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	165	154	162	150	119	112	94	70	46	26	-8	-26
CPU Revenue	75	96	106	98	71	66	55	40	27	15	-1	-27
Terminal Revenue	69	40	44	43	42	40	34	26	18	10	-12	-25
Peripheral Revenue (Turnkey)	21	19	11	9	6	6	5	3	2	1	-26	-28
Software Revenue	46	46	27	23	18	16	13	9	6	4	-21	-28
Bundled	29	36	20	19	15	15	12	8	4	2	-15	-31
Unbundled	17	10	7	4	3	2	1	1	1	1	-37	-15
Service Revenue	43	41	38	35	28	28	24	18	12	7	-10	-24
Total Factory Revenue	254	240	226	208	166	156	131	97	64	37	-10	-26
Increase over Prior Year (%)	-5	-5	-6	-8	-20	-6	-16	-26	-34	-42		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 80
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Worldwide
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	682	930	1,430	2,070	2,700	3,370	NA	38
Unit Shipments or Seats	NA	NA	NA	NA	682	930	1,430	2,070	2,700	3,370	NA	38
CPU Installed Base	NA	NA	NA	NA	682	1,600	2,930	4,710	6,790	9,270	NA	69
Installed Seats	NA	NA	NA	NA	682	1,600	2,930	4,710	6,790	9,270	NA	69
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	105.6	96.4	89.7	84.2	79.4	75.1	NA	-7
Hardware-Only ASP	NA	NA	NA	NA	48.3	43.1	39.2	37.1	36.1	35.9	NA	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	34	42	59	79	100	123	NA	29
CPU Revenue	NA	NA	NA	NA	31	37	53	72	91	112	NA	29
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	4	4	6	8	9	11	NA	25
Software Revenue	NA	NA	NA	NA	3	4	5	5	6	7	NA	17
Bundled	NA	NA	NA	NA	3	4	4	5	5	6	NA	17
Unbundled	NA	NA	NA	NA	0	0	0	1	1	1	NA	19
Service Revenue	NA	NA	NA	NA	10	13	19	26	33	42	NA	33
Total Factory Revenue	NA	NA	NA	NA	48	58	82	111	140	172	NA	29
Increase over Prior Year (%)	NA	NA	NA	NA	NA	22	40	35	26	23		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 81
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Worldwide
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	16,906	21,966	10,977	11,928	13,424	12,320	10,230	8,590	6,660	4,750	-6	-19
Unit Shipments or Seats	16,906	21,966	10,977	11,928	13,424	12,320	10,230	8,590	6,660	4,750	-6	-19
CPU Installed Base	27,383	48,478	56,745	62,406	65,336	64,030	59,840	54,810	49,200	42,410	24	-8
Installed Seats	27,383	48,478	56,745	62,406	65,336	64,030	59,840	54,810	49,200	42,410	24	-8
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.0	10.7	12.1	15.3	13.8	14.0	13.7	13.5	13.3	12.8	6	-1
Hardware-Only ASP	4.6	5.4	5.5	5.4	5.2	5.1	5.0	5.0	4.9	4.8	3	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	84	123	72	77	80	71	57	46	35	24	-1	-21
CPU Revenue	79	112	68	69	75	67	55	45	34	23	-1	-21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	4	11	4	8	4	3	2	2	1	1	0	-32
Software Revenue	69	57	43	44	55	53	46	42	38	32	-6	-10
Bundled	8	4	3	4	10	12	6	4	2	1	8	-45
Unbundled	62	53	41	39	44	41	41	39	36	32	-8	-6
Service Revenue	9	9	7	7	8	8	7	7	6	5	-3	-9
Total Factory Revenue	162	189	122	128	142	132	111	96	78	61	-3	-16
Increase over Prior Year (%)	56	16	-35	5	11	-8	-16	-14	-18	-22		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 82
Preliminary History and Forecast

Application:	PCB/Hybrid/MCM												
Region:	North America												
Platform:	All Platforms												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996	
HARDWARE SHIPMENT DATA													
CPU Shipments	8,857	14,582	9,414	10,240	11,094	12,570	13,150	13,790	14,400	15,060	6	6	
Unit Shipments or Seats	9,698	14,776	10,189	11,206	12,097	13,520	13,890	14,250	14,640	15,160	6	5	
CPU Installed Base	17,964	31,743	39,169	45,299	49,810	53,760	56,880	59,720	61,860	64,240	29	5	
Installed Seats	21,267	34,943	42,683	49,188	54,053	58,320	61,560	64,110	65,620	67,120	26	4	
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)													
Turnkey ASP	75.5	89.4	61.0	58.4	58.4	53.9	51.4	49.5	48.4	47.4	-6	-4	
Hardware-Only ASP	9.5	8.3	15.0	14.8	13.6	13.5	13.4	13.2	13.2	13.1	9	-1	
REVENUE DATA (Millions of U.S. Dollars)													
Hardware Revenue	128	176	168	180	172	189	197	204	212	219	8	5	
CPU Revenue	88	144	136	145	139	154	165	176	188	197	12	7	
Terminal Revenue	24	9	18	22	21	21	17	11	6	2	-3	-35	
Peripheral Revenue (Turnkey)	16	22	14	14	12	13	15	17	18	19	-6	10	
Software Revenue	77	94	85	98	96	100	116	134	154	175	6	13	
Bundled	22	36	38	41	33	37	42	48	52	54	10	11	
Unbundled	55	58	47	57	63	64	74	86	102	121	4	14	
Service Revenue	38	43	48	65	64	74	87	100	115	129	14	15	
Total Factory Revenue	244	313	300	342	332	363	400	438	481	524	8	10	
Increase over Prior Year (%)	3	28	-4	14	-3	9	10	10	10	9			

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 83

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,327	2,322	3,882	4,531	4,957	6,310	7,750	9,280	10,730	12,100	39	20
Unit Shipments or Seats	1,327	2,322	3,882	4,531	4,957	6,310	7,750	9,280	10,730	12,100	39	20
CPU Installed Base	4,068	6,201	9,639	13,357	17,096	21,710	26,670	31,860	36,540	41,900	43	20
Installed Seats	4,068	6,201	9,639	13,357	17,096	21,710	26,670	31,860	36,540	41,900	43	20
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	74.4	76.5	54.9	53.6	54.9	52.4	50.3	48.8	47.6	46.5	-7	-3
Hardware-Only ASP	22.9	20.3	15.4	14.9	12.2	11.1	10.2	9.6	9.2	9.0	-15	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	48	75	79	87	76	89	102	114	126	136	13	12
CPU Revenue	37	57	68	78	69	81	92	103	114	124	17	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	10	18	11	10	7	9	10	11	12	12	-8	10
Software Revenue	34	57	59	76	73	84	101	120	140	162	21	17
Bundled	17	31	35	37	29	35	40	46	49	51	15	12
Unbundled	18	26	24	39	44	49	61	74	91	111	26	20
Service Revenue	19	25	31	48	45	54	65	76	89	102	25	18
Total Factory Revenue	100	157	169	211	194	226	268	311	355	400	18	16
Increase over Prior Year (%)	5	57	7	25	-8	17	18	16	14	12		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 84

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: North America
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	74	364	565	510	213	220	190	130	80	30	30	-32
Unit Shipments or Seats	915	557	1,340	1,475	1,216	1,180	920	590	320	140	7	-35
CPU Installed Base	952	1,197	1,591	1,894	1,883	1,890	1,840	1,660	1,360	960	19	-13
Installed Seats	4,255	4,397	5,105	5,783	6,127	6,450	6,520	6,060	5,120	3,840	10	-9
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	353.5	284.5	302.0	393.8	317.6	303.4	290.9	278.8	267.0	256.4	-3	-4
Hardware-Only ASP	5,497.2	104.7	103.8	116.4	239.1	217.7	199.8	183.2	167.7	154.3	-54	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	49	45	63	64	50	49	38	24	13	5	1	-36
CPU Revenue	21	32	42	40	28	26	20	12	7	3	8	-37
Terminal Revenue	24	9	18	22	21	21	17	11	6	2	-3	-35
Peripheral Revenue (Turnkey)	5	4	3	3	2	2	1	1	0	0	-21	-39
Software Revenue	13	8	6	5	5	1	1	0	0	0	-23	-100
Bundled	4	4	3	4	3	1	0	0	0	0	-10	-100
Unbundled	8	4	3	2	2	1	0	0	0	0	-35	-100
Service Revenue	17	13	15	15	11	10	8	5	3	1	-10	-36
Total Factory Revenue	79	67	84	85	66	61	47	29	16	7	-4	-37
Increase over Prior Year (%)	-16	-16	26	1	-22	-8	-23	-37	-46	-58		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 85
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: North America
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	337	520	870	1,300	1,690	1,990	NA	43
Unit Shipments or Seats	NA	NA	NA	NA	337	520	870	1,300	1,690	1,990	NA	43
CPU Installed Base	NA	NA	NA	NA	337	850	1,670	2,810	4,150	5,620	NA	76
Installed Seats	NA	NA	NA	NA	337	850	1,670	2,810	4,150	5,620	NA	76
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	79.2	75.7	72.6	69.5	66.6	63.9	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	48.6	44.2	40.6	38.6	37.4	36.7	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	17	23	36	51	64	73	NA	35
CPU Revenue	NA	NA	NA	NA	15	21	32	46	58	67	NA	35
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	2	2	3	5	6	7	NA	34
Software Revenue	NA	NA	NA	NA	1	1	2	2	3	3	NA	36
Bundled	NA	NA	NA	NA	1	1	2	2	3	3	NA	36
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	15
Service Revenue	NA	NA	NA	NA	5	7	12	17	21	25	NA	38
Total Factory Revenue	NA	NA	NA	NA	22	32	49	70	88	102	NA	36
Increase over Prior Year (%)	NA	NA	NA	NA	NA	44	54	42	26	16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 86
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: North America
Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,456	11,896	4,968	5,200	5,587	5,510	4,340	3,080	1,900	940	-7	-30
Unit Shipments or Seats	7,456	11,896	4,968	5,200	5,587	5,510	4,340	3,080	1,900	940	-7	-30
CPU Installed Base	12,944	24,345	27,939	30,048	30,494	29,310	26,700	23,380	19,810	15,760	24	-12
Installed Seats	12,944	24,345	27,939	30,048	30,494	29,310	26,700	23,380	19,810	15,760	24	-12
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	11.9	320.0	12.9	17.1	14.6	14.5	14.2	14.0	13.8	13.5	5	-2
Hardware-Only ASP	4.1	4.5	5.3	5.2	5.0	5.0	4.9	4.8	4.7	4.6	5	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	31	55	26	28	29	27	21	15	9	4	-2	-31
CPU Revenue	31	55	26	27	28	27	21	15	9	4	-3	-31
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	1	1	1	0	0	0	0	32	-36
Software Revenue	30	29	19	16	18	14	13	12	11	10	-12	-11
Bundled	1	1	0	0	0	0	0	0	0	0	-42	-33
Unbundled	29	28	19	16	18	14	13	12	11	10	-11	-11
Service Revenue	3	4	2	2	3	2	2	2	2	2	-3	-10
Total Factory Revenue	64	89	47	46	50	44	36	29	22	16	-6	-20
Increase over Prior Year (%)	39	38	-46	-2	7	-11	-18	-20	-23	-28		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 87
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Europe
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	7,493	8,608	7,443	8,483	8,669	7,640	8,130	9,570	11,320	14,080	4	10
Unit Shipments or Seats	7,867	8,812	8,185	9,081	9,315	8,180	8,600	9,910	11,510	14,170	4	9
CPU Installed Base	13,022	21,284	27,554	33,332	37,475	39,060	39,960	41,490	43,930	48,950	30	5
Installed Seats	14,200	22,672	29,686	36,015	40,613	42,410	43,400	44,790	46,790	51,120	30	5
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	44.4	48.2	46.8	50.0	48.6	49.5	59.1	57.3	55.3	53.6	2	2
Hardware-Only ASP	10.4	11.5	17.5	14.7	13.9	13.4	12.7	12.1	11.9	12.1	8	-3
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	120	153	160	162	146	132	138	148	164	198	5	6
CPU Revenue	91	132	139	141	130	117	125	138	157	193	9	8
Terminal Revenue	17	8	17	14	13	11	10	8	5	3	-6	-27
Peripheral Revenue (Turnkey)	13	13	5	7	3	3	3	3	2	2	-29	-8
Software Revenue	113	95	94	98	96	111	118	126	132	142	-4	8
Bundled	38	34	45	43	42	52	50	50	50	52	3	4
Unbundled	76	61	49	55	54	58	68	76	81	90	-8	11
Service Revenue	43	45	52	62	62	65	73	81	91	110	10	12
Total Factory Revenue	276	293	306	322	304	307	329	356	387	450	2	8
Increase over Prior Year (%)	30	6	5	5	-6	1	7	8	9	16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 88
Preliminary History and Forecast

Application:	PCB/Hybrid/MCM												
Region:	Europe												
Platform:	Technical Workstation												
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996	
HARDWARE SHIPMENT DATA													
CPU Shipments	1,317	2,008	3,135	3,459	3,117	3,050	4,200	5,760	8,030	11,470	24	30	
Unit Shipments or Seats	1,317	2,008	3,135	3,459	3,117	3,050	4,200	5,760	8,030	11,470	24	30	
CPU Installed Base	3,230	5,114	7,960	10,848	12,997	14,600	16,600	19,360	23,400	30,550	42	19	
Installed Seats	3,230	5,114	7,960	10,848	12,997	14,600	16,600	19,360	23,400	30,550	42	19	
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)													
Turnkey ASP	72.1	65.1	60.9	54.7	62.1	59.5	57.2	55.7	54.4	53.2	-4	-3	
Hardware-Only ASP	24.1	24.0	16.0	16.7	15.0	13.6	12.5	11.7	11.3	11.0	-11	-6	
REVENUE DATA (Millions of U.S. Dollars)													
Hardware Revenue	51	75	83	82	69	62	76	93	118	155	8	18	
CPU Revenue	43	67	82	82	68	62	76	93	118	155	12	18	
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA	
Peripheral Revenue (Turnkey)	8	8	1	0	0	0	0	0	0	0	-58	-100	
Software Revenue	72	68	70	74	66	74	86	99	111	127	-2	14	
Bundled	32	28	40	38	32	36	40	43	47	51	-0	10	
Unbundled	39	39	30	36	34	38	46	55	64	76	-3	17	
Service Revenue	24	29	37	48	45	47	56	66	78	96	17	16	
Total Factory Revenue	146	171	190	203	180	184	218	258	307	378	5	16	
Increase over Prior Year (%)	13	17	11	7	-12	2	18	18	19	23			

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 89
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Europe
Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	62	262	368	350	178	180	170	140	100	50	30	-22
Unit Shipments or Seats	436	467	1,110	949	824	730	640	490	290	130	17	-31
CPU Installed Base	336	588	924	1,214	1,322	1,420	1,470	1,390	1,190	900	41	-7
Installed Seats	1,514	1,976	3,055	3,896	4,461	4,780	4,910	4,690	4,050	3,060	31	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	378.4	441.7	376.8	388.6	369.2	344.2	329.8	315.2	301.6	280.8	-1	-5
Hardware-Only ASP	1,766.4	110.5	133.5	122.9	209.3	193.0	178.0	164.3	150.8	139.3	-41	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	39	40	54	49	39	37	33	26	15	7	-0	-29
CPU Revenue	20	29	35	33	24	24	21	16	9	4	5	-30
Terminal Revenue	17	8	17	14	13	11	10	8	5	3	-6	-27
Peripheral Revenue (Turnkey)	3	3	3	2	2	2	2	1	1	0	-12	-32
Software Revenue	11	7	6	5	4	7	7	4	2	0	-21	-49
Bundled	4	4	3	4	4	7	7	4	2	0	3	-49
Unbundled	7	3	2	1	0	0	0	0	0	0	-60	-100
Service Revenue	14	12	12	13	10	11	10	8	5	2	-7	-29
Total Factory Revenue	64	59	72	67	54	56	50	37	22	9	-4	-30
Increase over Prior Year (%)	47	-8	24	-8	-19	4	-10	-25	-42	-58		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 90

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	198	190	230	280	390	630	NA	26
Unit Shipments or Seats	NA	NA	NA	NA	198	190	230	280	390	630	NA	26
CPU Installed Base	NA	NA	NA	NA	198	380	580	800	1,060	1,530	NA	50
Installed Seats	NA	NA	NA	NA	198	380	580	800	1,060	1,530	NA	50
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	94.0	91.0	87.5	83.8	81.2	77.9	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	55.7	50.6	46.5	44.2	42.8	42.0	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	11	10	11	13	17	27	NA	19
CPU Revenue	NA	NA	NA	NA	10	9	10	12	16	25	NA	19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	1	1	1	1	2	NA	17
Software Revenue	NA	NA	NA	NA	0	1	1	1	1	1	NA	15
Bundled	NA	NA	NA	NA	0	1	1	1	1	1	NA	15
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	0
Service Revenue	NA	NA	NA	NA	4	3	4	5	6	10	NA	22
Total Factory Revenue	NA	NA	NA	NA	15	14	15	18	24	38	NA	20
Increase over Prior Year (%)	NA	NA	NA	NA	NA	-12	14	17	32	58		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 91

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Europe
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	6,114	6,337	3,940	4,673	5,176	4,220	3,530	3,380	2,810	1,930	-4	-18
Unit Shipments or Seats	6,114	6,337	3,940	4,673	5,176	4,220	3,530	3,380	2,810	1,930	-4	-18
CPU Installed Base	9,456	15,581	18,671	21,271	22,958	22,650	21,310	19,940	18,290	15,980	25	-7
Installed Seats	9,456	15,581	18,671	21,271	22,958	22,650	21,310	19,940	18,290	15,980	25	-7
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	7.1	7.9	7.2	14.8	13.2	14.4	14.3	14.2	14.1	13.4	17	0
Hardware-Only ASP	4.7	5.9	5.6	5.5	5.3	5.2	5.1	5.1	5.0	4.9	3	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	30	38	23	30	27	22	18	17	14	9	-2	-19
CPU Revenue	28	37	21	26	27	22	18	17	14	9	-1	-19
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue: (Turnkey)	2	1	1	5	0	0	0	0	0	0	-34	-21
Software Revenue	31	21	18	20	26	29	25	22	19	14	-4	-12
Bundled	2	2	1	1	6	8	3	2	1	0	41	-59
Unbundled	29	19	17	19	20	21	22	21	18	14	-9	-7
Service Revenue	5	4	2	2	2	3	3	3	2	2	-15	-5
Total Factory Revenue	65	63	43	52	56	54	46	42	35	25	-4	-15
Increase over Prior Year (%)	66	-4	-31	21	6	-3	-16	-8	-17	-28		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 92
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Asia
Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	4,380	5,482	5,983	6,120	7,327	8,060	8,920	10,800	12,460	13,390	14	13
Unit Shipments or Seats	4,973	6,061	6,473	6,465	7,712	8,370	9,180	11,030	12,670	13,580	12	12
CPU Installed Base	7,132	12,433	17,846	22,603	27,453	31,930	35,910	40,540	45,090	49,870	40	13
Installed Seats	9,015	14,883	20,726	25,654	30,552	34,860	38,580	42,870	47,080	51,500	36	11
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	118.9	118.2	57.7	59.1	52.3	51.2	50.8	52.5	54.2	55.0	-19	1
Hardware-Only ASP	17.0	10.6	19.5	15.3	14.5	13.0	12.2	11.5	11.0	10.7	-4	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	172	176	187	182	202	197	191	211	233	239	4	3
CPU Revenue	108	104	136	135	134	134	133	150	167	172	6	5
Terminal Revenue	27	22	8	6	6	5	5	5	5	4	-33	-5
Peripheral Revenue (Turnkey)	37	49	43	41	62	58	53	56	62	62	14	0
Software Revenue	78	104	124	128	155	164	169	191	213	229	19	8
Bundled	64	80	99	95	95	90	82	87	97	100	10	1
Unbundled	13	24	25	33	60	74	87	103	116	129	46	17
Service Revenue	29	37	34	33	39	42	46	54	64	70	8	13
Total Factory Revenue	278	317	346	343	396	403	406	456	510	538	9	6
Increase over Prior Year (%)	51	14	9	-1	15	2	1	12	12	6		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 93
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Asia
Platform: Technical Workstation

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	1,132	1,730	3,900	3,963	4,653	5,420	6,560	8,670	10,540	11,630	42	20
Unit Shipments or Seats	1,132	1,730	3,900	3,963	4,653	5,420	6,560	8,670	10,540	11,630	42	20
CPU Installed Base	1,800	3,502	7,296	10,984	15,025	19,270	23,500	28,530	33,630	39,150	70	21
Installed Seats	1,800	3,502	7,296	10,984	15,025	19,270	23,500	28,530	33,630	39,150	70	21
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	143.1	97.8	65.8	70.1	65.7	62.6	60.1	58.3	56.8	55.6	-18	-3
Hardware-Only ASP	25.3	14.5	12.8	13.2	12.5	11.4	10.5	9.9	9.5	9.2	-16	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	79	81	125	133	149	149	149	172	196	205	17	7
CPU Revenue	57	53	90	98	94	96	100	120	138	145	13	9
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	22	29	35	35	55	53	48	52	58	60	26	2
Software Revenue	47	68	104	109	135	146	154	178	202	219	30	10
Bundled	39	51	85	81	81	79	73	81	92	95	20	3
Unbundled	9	17	19	28	53	67	81	97	111	124	58	18
Service Revenue	16	21	22	25	29	33	36	45	55	61	16	16
Total Factory Revenue	143	170	252	267	313	328	339	395	453	486	22	9
Increase over Prior Year (%)	194	20	48	6	17	5	3	17	15	7		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 94

Preliminary History and Forecast

Application:	PCB/Hybrid/MCM											
Region:	Asia											
Platform:	Host-Dependent											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	242	237	250	374	294	250	190	160	140	120	5	-16
Unit Shipments or Seats	835	816	741	719	679	560	450	390	340	310	-5	-15
CPU Installed Base	850	1,081	1,301	1,586	1,717	1,760	1,720	1,610	1,420	1,160	19	-8
Installed Seats	2,733	3,530	4,182	4,638	4,816	4,700	4,380	3,940	3,410	2,790	15	-10
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	323.7	533.8	536.9	120.7	96.1	90.3	86.6	83.0	79.6	76.2	-26	-5
Hardware-Only ASP	791.7	101.1	87.9	98.9	249.0	218.7	201.1	184.7	169.5	156.3	-25	-9
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	72	67	40	32	25	21	18	16	14	12	-23	-13
CPU Revenue	32	33	26	22	17	14	11	10	8	7	-14	-16
Terminal Revenue	27	22	8	6	6	5	5	5	5	4	-33	-5
Peripheral Revenue (Turnkey)	13	12	6	4	2	2	1	1	1	1	-34	-23
Software Revenue	22	30	14	12	9	7	5	4	3	3	-20	-21
Bundled	21	28	13	11	8	6	4	3	2	2	-21	-27
Unbundled	2	2	1	1	1	1	1	1	1	1	-12	4
Service Revenue	11	15	10	6	6	5	5	4	4	3	-14	-11
Total Factory Revenue	105	111	64	50	40	34	28	24	21	19	-21	-14
Increase over Prior Year (%)	-12	6	-43	-21	-20	-15	-19	-13	-13	-10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 95

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	130	180	280	400	490	560	NA	34
Unit Shipments or Seats	NA	NA	NA	NA	130	180	280	400	490	560	NA	34
CPU Installed Base	NA	NA	NA	NA	130	310	570	910	1,280	1,670	NA	67
Installed Seats	NA	NA	NA	NA	130	310	570	910	1,280	1,670	NA	67
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	130.7	124.9	119.7	115.0	110.2	105.8	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	33.2	30.4	27.9	26.5	25.7	25.3	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	6	7	9	12	14	16	NA	22
CPU Revenue	NA	NA	NA	NA	5	6	8	11	13	14	NA	24
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	1	1	1	1	2	2	NA	7
Software Revenue	NA	NA	NA	NA	2	2	2	3	3	3	NA	8
Bundled	NA	NA	NA	NA	2	2	2	2	2	2	NA	4
Unbundled	NA	NA	NA	NA	0	0	0	1	1	1	NA	20
Service Revenue	NA	NA	NA	NA	1	2	2	3	4	5	NA	34
Total Factory Revenue	NA	NA	NA	NA	9	11	14	18	21	23	NA	21
Increase over Prior Year (%)	NA	NA	NA	NA	NA	21	30	28	17	10		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 96

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Asia
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3,006	3,515	1,832	1,783	2,250	2,210	1,890	1,580	1,290	1,090	-7	-13
Unit Shipments or Seats	3,006	3,515	1,832	1,783	2,250	2,210	1,890	1,580	1,290	1,090	-7	-13
CPU Installed Base	4,482	7,851	9,249	10,032	10,582	10,580	10,130	9,490	8,760	7,890	24	-6
Installed Seats	4,482	7,851	9,249	10,032	10,582	10,580	10,130	9,490	8,760	7,890	24	-6
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	18.6	12.0	15.2	15.5	14.1	13.7	13.5	13.3	13.1	12.8	-7	-2
Hardware-Only ASP	6.1	7.9	6.2	5.4	5.3	5.3	5.2	5.1	5.0	4.9	-3	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	21	28	22	17	21	19	15	12	8	6	0	-22
CPU Revenue	19	18	19	15	18	17	14	10	8	6	-1	-21
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	2	9	2	2	3	2	2	1	1	0	6	-33
Software Revenue	8	6	6	7	9	8	8	6	5	3	4	-18
Bundled	5	1	2	3	4	3	3	2	1	0	-5	-36
Unbundled	3	5	4	4	5	5	5	4	4	3	14	-11
Service Revenue	1	1	2	2	3	3	2	2	1	1	22	-19
Total Factory Revenue	30	35	30	27	33	30	25	20	14	10	2	-21
Increase over Prior Year (%)	82	16	-16	-10	25	-10	-16	-22	-26	-28		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 97

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: All Platforms

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	367	293	307	352	487	520	670	870	1,120	1,410	7	24
Unit Shipments or Seats	409	315	380	453	594	630	790	980	1,220	1,450	10	20
CPU Installed Base	696	965	1,205	1,415	1,679	1,920	2,270	2,770	3,440	4,330	25	21
Installed Seats	751	1,031	1,330	1,626	1,972	2,290	2,710	3,260	3,940	4,730	27	19
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	33.1	74.0	88.5	75.5	62.0	90.6	90.9	83.6	73.0	64.7	17	1
Hardware-Only ASP	19.0	15.8	19.6	19.6	15.4	16.1	15.5	14.6	13.6	11.4	-5	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	7	6	7	8	8	9	12	14	17	18	3	17
CPU Revenue	5	5	5	5	6	7	9	11	14	16	3	22
Terminal Revenue	2	1	2	2	2	2	2	2	2	0	6	-26
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	1	1	1	1	-7	31
Software Revenue	2	2	1	2	2	2	3	3	7	9	3	37
Bundled	1	1	1	1	1	1	1	1	1	2	1	22
Unbundled	1	1	1	1	1	1	2	2	6	8	5	41
Service Revenue	1	1	1	2	2	2	3	4	6	7	19	35
Total Factory Revenue	10	9	10	11	12	14	17	21	30	35	5	24
Increase over Prior Year (%)	-34	-7	7	15	6	14	28	19	46	16		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 98
Preliminary History and Forecast

Application:	PCB/Hybrid/MCM											
Region:	Rest of World											
Platform:	Technical Workstation											
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	33	60	45	52	43	80	130	200	290	410	6	57
Unit Shipments or Seats	33	60	45	52	43	80	130	200	290	410	6	57
CPU Installed Base	159	214	245	265	260	280	350	490	700	1,020	13	31
Installed Seats	159	214	245	265	260	280	350	490	700	1,020	13	31
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	47.3	49.9	44.5	44.2	45.8	43.7	41.9	40.7	39.7	38.8	-1	-3
Hardware-Only ASP	37.2	19.6	23.1	20.6	15.3	13.9	12.8	12.0	11.6	11.2	-20	-6
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	2	1	1	1	1	2	3	4	5	-8	45
CPU Revenue	1	1	1	1	1	1	2	2	3	5	-7	45
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	1	-14	44
Software Revenue	1	1	0	1	0	1	1	0	4	4	-15	63
Bundled	0	0	0	0	0	0	0	0	1	1	-15	34
Unbundled	0	0	0	0	0	0	1	0	3	3	-13	85
Service Revenue	0	1	1	1	0	1	1	1	3	4	11	54
Total Factory Revenue	2	3	2	2	2	2	4	4	11	13	-6	52
Increase over Prior Year (%)	-55	42	-25	11	-34	55	52	14	147	23		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 99

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: Host-Dependent

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	3	16	25	27	15	20	20	20	20	10	50	-8
Unit Shipments or Seats	45	38	99	128	122	130	140	140	120	40	28	-20
CPU Installed Base	36	50	72	94	100	100	110	110	100	80	29	-4
Installed Seats	91	116	198	305	392	470	550	600	600	480	44	4
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	590.9	771.2	743.9	486.8	352.7	336.9	323.1	309.6	296.5	284.7	-12	-4
Hardware-Only ASP	2,155.4	145.9	156.8	170.7	289.7	263.7	242.1	221.9	203.2	187.0	-39	-8
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	5	3	5	5	4	4	5	5	4	2	-2	-18
CPU Revenue	3	2	3	3	2	2	2	2	2	1	-6	-14
Terminal Revenue	2	1	2	2	2	2	2	2	2	0	6	-26
Peripheral Revenue (Turnkey)	0	0	0	0	0	0	0	0	0	0	-19	-7
Software Revenue	0	0	0	0	0	0	0	1	1	1	12	14
Bundled	0	0	0	0	0	0	0	1	1	1	30	14
Unbundled	0	0	0	NA	0	0	0	0	0	0	-100	NA
Service Revenue	0	1	1	1	1	1	1	1	1	1	20	-7
Total Factory Revenue	5	4	6	6	6	6	6	7	6	3	1	-13
Increase over Prior Year (%)	-38	-28	52	9	-13	5	12	1	-10	-53		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 100
Preliminary History and Forecast

Application: PCB/Hybrid/MCM
Region: Rest of World
Platform: Server

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	NA	NA	NA	NA	17	30	60	90	130	190	NA	62
Unit Shipments or Seats	NA	NA	NA	NA	17	30	60	90	130	190	NA	62
CPU Installed Base	NA	NA	NA	NA	17	50	100	180	300	450	NA	93
Installed Seats	NA	NA	NA	NA	17	50	100	180	300	450	NA	93
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	NA	NA	NA	NA	101.7	97.1	93.2	89.3	85.5	82.1	NA	-4
Hardware-Only ASP	NA	NA	NA	NA	49.1	44.7	41.0	39.0	37.8	37.1	NA	-5
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	NA	NA	NA	NA	1	2	2	4	5	7	NA	53
CPU Revenue	NA	NA	NA	NA	1	1	2	3	5	6	NA	53
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	NA	NA	NA	NA	0	0	0	0	1	1	NA	54
Software Revenue	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Bundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	38
Unbundled	NA	NA	NA	NA	0	0	0	0	0	0	NA	NA
Service Revenue	NA	NA	NA	NA	0	0	1	1	2	2	NA	56
Total Factory Revenue	NA	NA	NA	NA	1	2	3	5	7	10	NA	54
Increase over Prior Year (%)	NA	NA	NA	NA	NA	79	55	52	46	39		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Table 101

Preliminary History and Forecast

Application: PCB/Hybrid/MCM
 Region: Rest of World
 Platform: Personal Computer

	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	CAGR (%) 1987-1991	CAGR (%) 1991-1996
HARDWARE SHIPMENT DATA												
CPU Shipments	330	217	237	273	412	390	470	560	670	800	6	14
Unit Shipments or Seats	330	217	237	273	412	390	470	560	670	800	6	14
CPU Installed Base	501	701	887	1,056	1,303	1,480	1,700	1,990	2,340	2,780	27	16
Installed Seats	501	701	887	1,056	1,303	1,480	1,700	1,990	2,340	2,780	27	16
CALCULATED AVERAGE SELLING PRICE DATA (Thousands of U.S. Dollars)												
Turnkey ASP	3.3	14.6	19.8	18.0	11.8	11.7	11.5	11.3	11.2	10.9	38	-2
Hardware-Only ASP	4.7	6.3	5.4	5.4	5.4	5.3	5.3	5.2	5.1	5.0	4	-2
REVENUE DATA (Millions of U.S. Dollars)												
Hardware Revenue	1	1	1	2	2	2	2	3	3	4	12	12
CPU Revenue	1	1	1	1	2	2	2	3	3	4	12	12
Terminal Revenue	0	0	0	0	0	0	0	0	0	0	NA	NA
Peripheral Revenue (Turnkey)	0	NA	0	0	0	0	0	0	0	0	57	-20
Software Revenue	1	1	0	1	1	1	1	2	3	5	10	31
Bundled	0	NA	0	0	0	0	0	0	0	0	-12	-100
Unbundled	1	1	0	1	1	1	1	2	3	5	11	31
Service Revenue	0	0	0	0	0	0	0	0	0	1	-8	47
Total Factory Revenue	2	2	2	2	4	3	4	5	7	9	11	21
Increase over Prior Year (%)	46	-3	-27	42	50	-10	23	27	32	39		

NOTE: In 1991, server was added as a platform. This reclassification reduced 1991 growth rates for the other platforms.

Source: Dataquest (May 1992)

Dataquest

Dataquest Research and Sales Offices:

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
Phone: 01 (408) 437-8000
Telex: 171973
Fax: 01 (408) 437-0292
Technology Products Group
Phone: (800) 624-3280

Dataquest Incorporated
Ledgeway/Dataquest
The Corporate Center
550 Cochituate Road
Framingham, MA 01701
Phone: 01 (508) 370-5555
Fax: 01 (508) 370-6262

Dataquest Incorporated
Invitational Computer Conferences Division
3151 Airway Avenue, C-2
Costa Mesa, California 92626
Phone: 01 (714) 957-0171
Fax: 01 (714) 957-0903

Dataquest Australia
Suite 1, Century Plaza
80 Berry Street
North Sydney, NSW 2060
Australia
Phone: 61 (2) 959-4544
Fax: 61 (2) 929-0635

Dataquest Europe Limited
Roussel House, Broadwater Park
Denham, Uxbridge, Middx UB9 5HP
England
Phone: 44 (895) 835050
Fax: 44 (895) 835260/1

Dataquest Europe SA
Tour Galliéni 2
36, avenue du Général-de-Gaulle
93175 Bagnolet Cedex
France
Phone: 33 (1) 48 97 31 00
Telex: 233 263
Fax: 33 (1) 48 97 34 00

Dataquest GmbH
Kronstadter Strasse 9
8000 Munich 80
Germany
Phone: 49 (89) 93 09 09 0
Fax: 49 (89) 930 3277

Dataquest Germany
In der Schneithohl 17
6242 Kronberg 2
Germany
Phone: 49 6173/61685
Fax: 49 6173/67901

Dataquest Hong Kong
Rm. 401, Connaught Comm. Bldg.
185 Wanchai Rd.
Wanchai, Hong Kong
Phone: (852) 8387336
Fax: (852) 5722375

Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa, Chuo-ku
Tokyo, 104
Japan
Phone: 81 (3) 5566-0411
Fax: 81 (3) 5566-0425

Dataquest Korea
Daeheung Bldg. 1105
648-23 Yeoksam-dong
Kangnam-gu
Seoul, Korea 135
Phone: 82 (2) 556-4166
Fax: 82 (2) 552-2661

Dataquest Singapore
4012 Ang Mo Kio Industrial Park 1
Ave. 10, #03-10 to #03-12
Singapore 2056
Phone: 65 4597181
Telex: 38257
Fax: 65 4563129

Dataquest Taiwan
Room 801/8th Floor
Ever Spring Building
147, Sec. 2, Chien Kuo N. Rd.
Taipei, Taiwan R.O.C. 104
Phone: 886 (2) 501-7960
886 (2) 501-5592
Fax: 886 (2) 505-4265

EDA Applications Preliminary Market Share

February 1992

Source:

Dataquest

Market Statistics

**CAD/CAM/CAE
Electronic Design Automation Applications**

**EDA Applications
Preliminary Market Share
February 1992**

**Source:
Dataquest**

Market Statistics

Dataquest®

File behind the *Market Statistics* tab inside the
binder labeled CAD/CAM/CAE—Electronic
Design Automation Applications

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February 1992

EDA Applications Preliminary Market Share

February 1992

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Note: All tables show estimated data.

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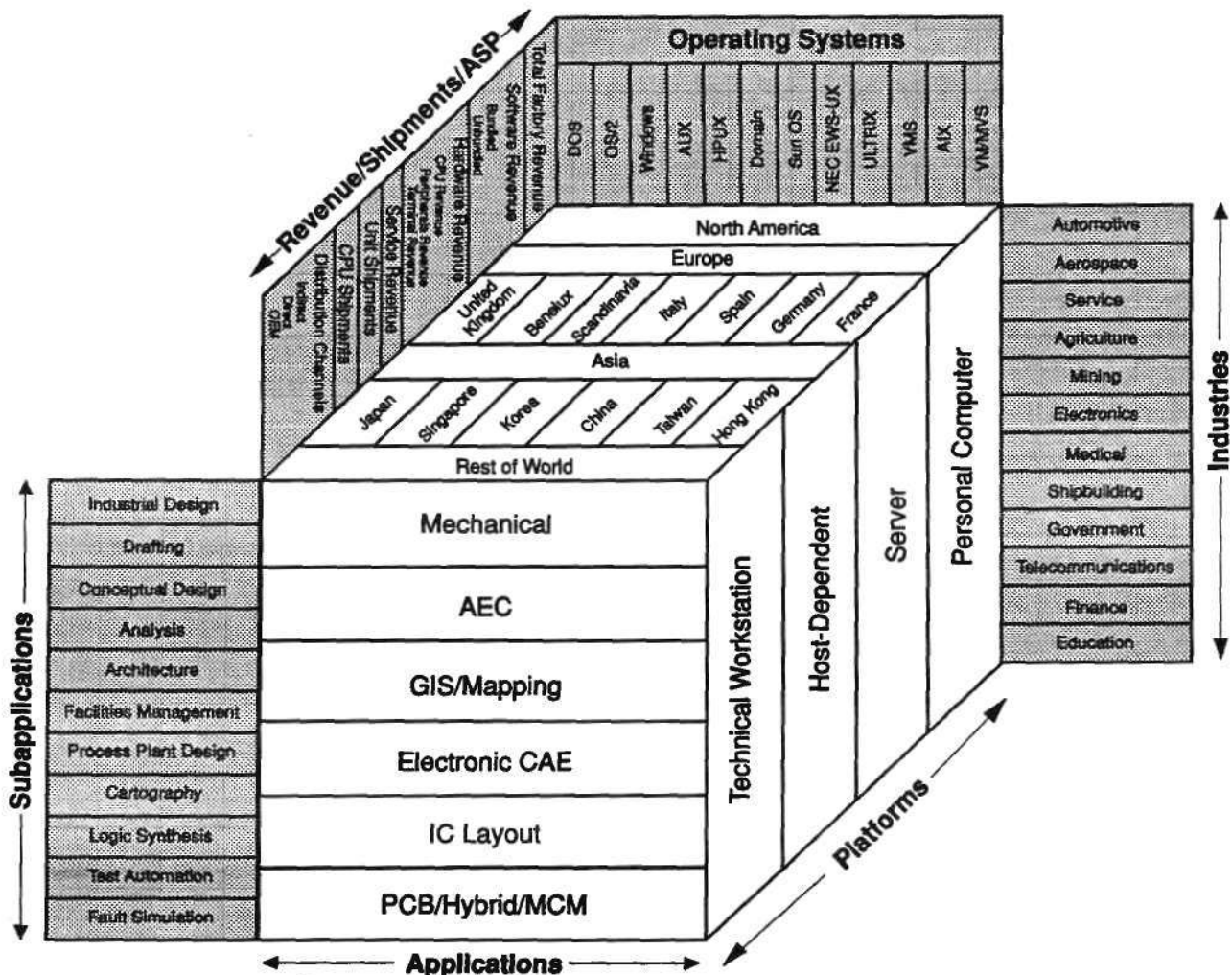
Introduction

CAD/CAM/CAE systems have dramatically changed the methods by which designers and production managers originate and implement products. CAD and CAE systems allow designers to create, draft, analyze, test, and manipulate products on a screen in two and three dimensions. As CAD/CAM/CAE systems continue

to decrease in cost, they become more available and cost justifiable to new users.

In order to provide a comprehensive view of the CAD/CAM/CAE industry, Dataquest's CAD/CAM/CAE group maintains a large database of industry information. The type of information contained in the database is depicted in Figure 1.

Figure 1
CAD/CAM/CAE Market Database



Source: Dataquest (February 1992)

This document contains Dataquest's detailed market share information on the CAD/CAM/CAE industry. Following is a description of the information reported in the *Market Share* book for each segment:

- Source—All companies in database; overview of industry
- Mechanical Applications—All companies in database with mechanical revenue
- AEC and GIS Applications—All companies in database with AEC or GIS revenue
- Electronic Design Automation Applications—All companies in database with EDA (electronic CAE, IC layout, PCB/hybrid/MCM) revenue
- Europe—All Europe-based companies and all other companies with more than \$1 million in European revenue
- Asia—All Asia-based companies and all other companies with more than \$1 million in Asian revenue
- Personal CAD and Distribution Channels—All companies in database with personal computer revenue

More detailed data on this market may be requested through our client inquiry service.

Segmentation

For complete information on Dataquest's high-technology market segmentation scheme, please refer to the *Dataquest High-Technology Guide—Segmentation and Glossary*.

Dataquest defines CAD/CAM/CAE as systems used in the mechanical; architecture, engineering, and construction (AEC); GIS/mapping; and electronic design automation (EDA) application areas. The CAD/CAM/CAE market is defined according to the following segmentation scheme:

- CAD/CAM/CAE
 - Mechanical
 - AEC (Architecture, Engineering, and Construction)
 - GIS/Mapping (Geographic Information Systems)

- EDA (Electronic Design Automation)
 - Electronic CAE
 - IC Layout
 - PCB/Hybrid/MCM

In addition, more detailed information by subapplication is available and usually published in *Dataquest Perspectives*.

For a listing of possible subapplication categories, see the *Dataquest High-Technology Guide—Segmentation and Glossary*.

Definitions

This section lists the definitions that are specific to this document. Complete definitions for all terms can be found in the *Dataquest High-Technology Guide—Segmentation and Glossary*.

Application definitions are as follows:

- Mechanical—Mechanical CAD/CAM refers to computer-aided tools used to design, analyze, document, and manufacture discrete parts, components, and assemblies.
- Architecture, Engineering, and Construction (AEC)—This segment covers the use of computer-aided tools by architects, contractors, plant engineers, civil engineers, and other people associated with these disciplines to aid in designing and managing buildings, industrial plants, ships, and other types of nondiscrete entities.
- Geographic Information Systems (GIS)/Mapping—This is a computer-based technology, composed of hardware, software, and data used to capture, edit, display, and analyze spatial (tagged by location) information.
- Electronic Design Automation (EDA)—This segment covers computer-based tools that are used to automate the process of designing an electronic product including printed circuit boards, ICs, and systems. EDA includes ECAE, IC Layout, and PCB/Hybrid/MCM, as follows:
 - Electronic Computer-Aided Engineering (CAE)—These are computer-aided tools

used in the engineering or design phase of electronic products (as opposed to the physical layout phase of the product). Examples of Electronic CAE applications are schematic capture and simulation.

- IC Layout—This is a software application tool that is used to create and validate the physical implementation of an integrated circuit (IC). The IC layout category comprises polygon editors, symbolic editors, placement and routing (gate array, cell, and block), design verification tools (DRC/ERC/logic-to-layout), compilers, and module development tools.
- Printed Circuit Board (PCB)/Hybrid/Multichip Module (MCM)—This segment covers products that are used to create the placement and routing of the traces and components laid out on a printed circuit board. Also, included in this category are thermal analysis tools.

Regional definitions are as follows:

- North America—Includes United States and Canada
- Europe—Includes the United Kingdom, Scandinavia, Benelux, France, Germany, Italy, Spain, and Rest of Europe
- Asia—Includes Japan, Singapore, Taiwan, Korea, China, and Hong Kong
- Rest of World—All other countries including Australia, New Zealand, Oceania, Africa, Central America, South America, and the Middle East

Platform definitions are as follows:

- Technical Workstation—This is a single-user computer that is distinguished from a personal computer by its features and by the user's potential range of expansion on the platform. Features include a virtual, multitasking operating system (UNIX, VMS, DOMAIN); the computer is designed by manufacturer to run high-performance graphic applications in a multiuser/multitasking environment.
- Host-Dependent—This is a shared logic system in which the external workstations' functions are dependent on a host computer.

- Server—A server is a computer that transparently provides its resources for use by other computer systems. It is a system on a network that provides specific functionality to other computer systems: the clients. Functions include file storage, database access, compute capability, and others. Dataquest tracks the following major categories of servers used for CAD/CAM/CAE and GIS applications:

- Compute Servers—These systems provide capabilities for solving numerical problems (for example, simulations, statistical calculations, and simultaneous partial differential equations). System features usually include high-speed computational capabilities (for example, vector and parallel processing) and large memories.
- Print Servers—These systems provide access to printers, specialized printing applications software, and print spooling resources to a network.
- File Servers—These systems provide mass storage capability to clients on a network. Services can range from temporary storage of working files to long-term backup and archive systems.
- Database Servers—These systems manage databases as a shared resource to a network. These servers handle such functions as physical data storage, data security, and high-level queries and can access stored information at the record level.

- Personal Computer—This is defined as a single-user computer that is distinguished from a technical workstation by its features and by the user's potential range of expansion on the platform. Features found in technical workstations (such as a virtual operating system, networking, high-performance graphics, multiuser/multitasking capability) are optional rather than integrated by the manufacturer.

Revenue/shipments/ASP definitions are as follows:

- Total factory revenue is defined as the amount of money received by a manufacturer for its goods measured in U.S. dollars. Total factory revenue does not include revenue that a company may receive from products that are sold to another company for resale (OEM revenue).

- Unit shipment is defined as the number of products delivered (that is, seats).
- Software revenue is revenue derived from the sale of bundled (part of a turnkey system) and unbundled software.
- Service revenue is defined as revenue derived from the service and support of CAD/CAM/CAE or GIS systems. Service revenue can be calculated in the tables by subtracting hardware and software revenue from total revenue.

Market Share Methodology

Dataquest uses both primary and secondary sources to produce our market share data. In the fourth quarter of each year, we survey all major participants in each industry. Each vendor is offered the opportunity to self-report the information required. Although there is a primary contact for each company, large companies are surveyed across product lines and across geographic regions. Thus, there is a corresponding increase in the number of contacts at large companies. (Dataquest maintains a large contact database on all sources of information). Examples of the job titles of people contacted for information are the following:

- President and CEO
- Vice President and General Manager
- Vice President of Marketing
- Vice President, Strategic Product Planning
- Director of Strategic Planning
- Director of Marketing
- Director of Market Development
- Manager, CAD/CAM/CAE Marketing Programs
- Market Research Analyst

We resurvey select companies during the second quarter of the following year to verify final annual results and then publish final market share information based on this updated information. Our annual delivery schedule is as follows:

- First Quarter (January 31)—Preliminary market data are available. All tables will be published and distributed to clients. Historical database is opened for changes for a six-month period.

- Second Quarter (March 31)—We provide complete preliminary forecast tables, including a new five-year forecast period.
- Third Quarter (July 1)—We send complete, final updated market share tables based on additional data collection and analysis over the previous six months, as well as company history tables. At this point, the market share database is frozen and will not be changed until the end of the year. For the next six months, supplementary market data will be based on these final market data.
- Fourth Quarter (October 1)—We provide complete final forecast tables, taking into consideration changes in the market during the previous six months.

The Audit Process

Data supplied by vendors are evaluated against information drawn from many sources, including the following:

- Revenue published by major industry participants
- Estimates made by knowledgeable and reliable industry spokespersons
- Government data or trade association data
- Published product literature and price lists
- Interviews with knowledgeable manufacturers, distributors, and users
- Relevant economic data
- Information and data from online data banks
- Articles in both the general and trade press
- Annual reports, SEC documents, credit reports
- Company publications and press releases
- Reports from financial analysts
- User studies
- Reseller and supplier reports and reports from a vendor's competitors

In addition, Dataquest sums vendor revenue across other industries covered by Dataquest to make sure that revenue is not credited twice and checks with multiple sources at one company to cross-check data on that company.

Dataquest analysts have many years of experience in how to apply the above tools to get the most accurate information possible on a particular company (such as what to use when and what industry averages are). We believe that the estimates presented here are the most accurate and meaningful generally available today. It is the CAD/CAM/CAE group's policy to continually update our market information for any year, based on any new data received, in order to arrive at the most accurate market representation possible.

Dataquest's CAD/CAM/CAE market numbers are often higher than those reported by other sources. We survey worldwide, which involves more vendors, higher total market revenue, lower market share per vendor, and a more accurate market picture—particularly useful when comparing regions or applications.

Notes on Market Share

For the 1991 market share cycle, Dataquest's CAD/CAM/CAE group added server as a platform. The platform categories now include

technical workstation, host-dependent, server, and personal computer. Revenue formerly classified in technical workstations, host-dependent, or personal computer may now be more accurately classified, where appropriate, in the server category. However, because of this reclassification, data and growth rates for the other platform areas were affected.

Finally, please note that despite the care taken in gathering and analyzing the available data and in attempting to categorize those data in a meaningful way, careful attention must be paid to the definitions and assumptions used herein when interpreting the estimates presented in this document. Various companies, government agencies, and trade associations may use slightly different definitions of product categories and regional groupings, or they may include different companies in their summaries. These differences should be kept in mind when making comparisons between these data and those provided by others.

Table 1

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	402.5	115.7	169.1	3,911	12.2%	7.8%	13.2%	3.6%
Sun	363.7	316.4	.0	22,022	11.0%	21.3%	.0%	20.3%
Cadence	233.6	.0	195.2	0	7.1%	.0%	15.3%	.0%
Digital	227.8	158.5	5.4	1,533	6.9%	10.7%	.4%	1.4%
Valid	152.1	5.3	109.6	625	4.6%	.4%	8.6%	.6%
Hewlett-Packard	151.3	124.4	.0	13,666	4.6%	8.4%	.0%	12.6%
Intergraph	133.8	37.6	44.7	1,079	4.0%	2.5%	3.5%	1.0%
Compaq	119.8	119.8	.0	20,491	3.6%	8.1%	.0%	18.9%
Zuken	103.9	41.6	62.3	606	3.1%	2.8%	4.9%	.6%
IBM	90.3	67.4	11.2	10,879	2.7%	4.5%	.9%	10.0%
Racal-Redac	85.0	3.5	67.6	346	2.6%	.2%	5.3%	.3%
NEC	78.5	53.0	19.3	4,937	2.4%	3.6%	1.5%	4.6%
Fujitsu	73.2	48.7	17.2	1,636	2.2%	3.3%	1.3%	1.5%
Computervision	57.9	20.9	15.4	595	1.8%	1.4%	1.2%	.5%
Synopsys	41.9	.0	31.4	0	1.3%	.0%	2.5%	.0%
Siemens Nixdorf Info systems	40.2	19.7	14.1	549	1.2%	1.3%	1.1%	.5%
Uchida Yoko	36.8	34.9	1.8	584	1.1%	2.4%	.1%	.5%
Wacom	36.6	7.3	25.5	603	1.1%	.5%	2.0%	.6%
Viewlogic Systems	36.5	.0	30.7	0	1.1%	.0%	2.4%	.0%
Scientific Calc.	32.3	3.7	19.1	123	1.0%	.2%	1.5%	.1%
COMPASS Design Automation-VLSI	31.8	3.2	28.1	66	1.0%	.2%	2.2%	.1%
Sharp System Products—NO OEM	31.2	16.2	15.0	186	.9%	1.1%	1.2%	.2%
Seiko Instruments—NO OEM	30.9	13.3	14.1	197	.9%	.9%	1.1%	.2%
Zycad	30.0	23.7	.0	230	.9%	1.6%	.0%	.2%

(Continued)

Table 1 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation

Platform: All Platforms

Region: Worldwide

Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped	Total			Hardware			Hardware Units Shipped	Market Share			Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Revenue		Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Revenue		Factory Revenue	Hardware Revenue	Software Revenue	
CADIX	22.6	9.0	11.3	9.0	11.3	9.0	11.3	9.0	166	.7%	.6%	.9%	.6%	.9%	.6%	166	.7%	.6%	.9%	.2%
Autodesk	22.3	.0	22.3	.0	22.3	.0	22.3	.0	0	.7%	.0%	1.7%	.0%	1.7%	.0%	0	.7%	.0%	1.7%	.0%
EEsof	20.5	.1	18.1	.1	18.1	.1	18.1	.1	15	.6%	.0%	1.4%	.0%	1.4%	.0%	15	.6%	.0%	1.4%	.0%
Apple Computer	18.5	16.3	.0	16.3	.0	16.3	.0	16.3	3,880	.6%	1.1%	.0%	1.1%	.0%	3,880	.6%	1.1%	.0%	3,880	3.6%
Xilinx	18.0	.0	16.2	.0	16.2	.0	16.2	.0	0	.5%	.0%	1.3%	.0%	1.3%	.0%	0	.5%	.0%	1.3%	.0%
LSI Logic	17.5	1.8	13.1	1.8	13.1	1.8	13.1	1.8	44	.5%	.1%	1.0%	.1%	1.0%	.1%	44	.5%	.1%	1.0%	.0%
Solbourne	16.5	16.3	.0	16.3	.0	16.3	.0	16.3	1,406	.5%	1.1%	.0%	1.1%	.0%	1,406	.5%	1.1%	.0%	1,406	1.3%
Teradyne	15.9	2.0	10.3	2.0	10.3	2.0	10.3	2.0	30	.5%	.1%	.8%	.1%	.8%	.1%	30	.5%	.1%	.8%	.0%
HP Cad	15.2	8.9	4.6	8.9	4.6	8.9	4.6	8.9	66	.5%	.6%	.4%	.6%	.4%	66	.5%	.6%	.4%	66	.1%
Toshiba—NO OEM	14.9	7.4	6.0	7.4	6.0	7.4	6.0	7.4	135	.5%	.5%	.5%	.5%	.5%	135	.5%	.5%	.5%	135	.1%
IPKF	14.4	4.0	9.0	4.0	9.0	4.0	9.0	4.0	620	.4%	.3%	.7%	.3%	.7%	620	.4%	.3%	.7%	620	.6%
Logic Automation	14.2	.0	14.2	.0	14.2	.0	14.2	.0	0	.4%	.0%	1.1%	.0%	1.1%	.0%	0	.4%	.0%	1.1%	.0%
Quickturn Systems	14.0	14.0	.0	14.0	.0	14.0	.0	14.0	75	.4%	.9%	.0%	.9%	.0%	75	.4%	.9%	.0%	75	.1%
Altera	13.7	.0	11.6	.0	11.6	.0	11.6	.0	0	.4%	.0%	.9%	.0%	.9%	.0%	0	.4%	.0%	.9%	.0%
Ikos Systems	13.1	13.1	.0	13.1	.0	13.1	.0	13.1	61	.4%	.9%	.0%	.9%	.0%	61	.4%	.9%	.0%	61	.1%
Data I/O	12.7	.0	12.7	.0	12.7	.0	12.7	.0	0	.4%	.0%	1.0%	.0%	1.0%	.0%	0	.4%	.0%	1.0%	.0%
ACTEL	12.5	.0	11.3	.0	11.3	.0	11.3	.0	0	.4%	.0%	.9%	.0%	.9%	.0%	0	.4%	.0%	.9%	.0%
Aucotec	11.4	4.0	6.3	4.0	6.3	4.0	6.3	4.0	181	.3%	.3%	.5%	.3%	.5%	181	.3%	.3%	.5%	181	.2%
Analogy	10.5	.0	9.5	.0	9.5	.0	9.5	.0	0	.3%	.0%	.7%	.0%	.7%	.0%	0	.3%	.0%	.7%	.0%
Hitachi	10.5	5.0	4.4	5.0	4.4	5.0	4.4	5.0	325	.3%	.3%	.3%	.3%	.3%	325	.3%	.3%	.3%	325	.3%
Orcad	10.5	.0	10.5	.0	10.5	.0	10.5	.0	0	.3%	.0%	.8%	.0%	.8%	.0%	0	.3%	.0%	.8%	.0%
Comdisco Systems	9.8	.0	8.8	.0	8.8	.0	8.8	.0	0	.3%	.0%	.7%	.0%	.7%	.0%	0	.3%	.0%	.7%	.0%
CADAM	9.6	4.2	4.6	4.2	4.6	4.2	4.6	4.2	596	.3%	.3%	.4%	.3%	.4%	596	.3%	.3%	.4%	596	.5%
Silvar-Iisico	9.5	.0	5.2	.0	5.2	.0	5.2	.0	0	.3%	.0%	.4%	.0%	.4%	.0%	0	.3%	.0%	.4%	.0%

(Continued)

Table 1 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total				Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
PADS Software	8.7	.0	7.4	0	.3%	.0%	.6%	.0%
Microsim	8.5	.0	8.0	0	.3%	.0%	.6%	.0%
Genrad	7.7	1.5	5.1	77	.2%	.1%	.4%	.1%
Ascent Logic Corp.	7.5	.0	6.0	0	.2%	.0%	.5%	.0%
Ziegler	7.3	.0	7.3	0	.2%	.0%	.6%	.0%
Vantage Analysis Systems	7.0	.0	6.0	0	.2%	.0%	.5%	.0%
Everex Systems	7.0	7.0	.0	2,070	.2%	.5%	.0%	1.9%
Meta-Software	6.8	.0	5.9	0	.2%	.0%	.5%	.0%
Test Systems Strategies	6.2	.0	5.4	0	.2%	.0%	.4%	.0%
Sophia Systems	6.0	1.5	3.9	85	.2%	.1%	.3%	.1%
Cascade Design Automation	5.5	.0	3.9	0	.2%	.0%	.3%	.0%
BETRONEX	5.5	.5	5.1	86	.2%	.0%	.4%	.1%
I-Logix	5.5	.0	5.5	0	.2%	.0%	.4%	.0%
Sony	5.2	4.6	.0	304	.2%	.3%	.0%	.3%
Tokyo Electron—NO OEM	4.7	1.6	2.3	17	.1%	.1%	.2%	.0%
AnaCAD	4.5	.0	4.5	0	.1%	.0%	.4%	.0%
Quad Design Technology	4.3	.0	4.0	0	.1%	.0%	.3%	.0%
Contec Microelectronics	4.0	.0	3.6	0	.1%	.0%	.3%	.0%
Sagantec	4.0	.0	3.6	0	.1%	.0%	.3%	.0%
Pacific Numerics	4.0	.0	4.0	0	.1%	.0%	.3%	.0%
Ontos	3.8	.0	3.8	0	.1%	.0%	.3%	.0%
Dell Computer	3.8	3.8	.0	977	.1%	.3%	.0%	.9%
Kloeckner-Moeller	3.7	.9	2.6	130	.1%	.1%	.2%	.1%
Compact Software	3.6	.0	2.9	0	.1%	.0%	.2%	.0%

(Continued)

Table 1 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Scientific & Engineering SW	3.5	.0	3.5	0	.1%	.0%	.3%	.0%
EPIC Design Technology	3.5	.0	3.1	0	.1%	.0%	.2%	.0%
Century Research Center	3.3	1.8	1.2	19	.1%	.1%	.1%	.0%
Integrated Silicon Systems	3.0	.5	2.5	18	.1%	.0%	.2%	.0%
Quantic Laboratories	2.9	.0	2.7	0	.1%	.0%	.2%	.0%
Research Machines	2.9	2.9	.0	460	.1%	.2%	.0%	.4%
Accel Technologies	2.7	.0	2.4	0	.1%	.0%	.2%	.0%
ALS Design	2.6	.2	2.4	50	.1%	.0%	.2%	.0%
ALDEC	2.5	.0	2.5	0	.1%	.0%	.2%	.0%
Infinite Graphics	2.5	.0	2.5	0	.1%	.0%	.2%	.0%
Motorola	2.5	.0	2.5	0	.1%	.0%	.2%	.0%
Visionics	2.4	.0	1.8	10	.1%	.0%	.1%	.0%
debis Systemhaus	2.4	.6	1.4	19	.1%	.0%	.1%	.0%
CAD-UL	2.1	.0	2.1	0	.1%	.0%	.2%	.0%
ISDATA	2.0	.0	1.7	0	.1%	.0%	.1%	.0%
Sumitomo Denko Workstation	1.8	1.8	.0	100	.1%	.1%	.0%	.1%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.1%	.0%
Massteck	1.8	.0	1.8	0	.1%	.0%	.1%	.0%
SIMUCAD	1.7	.0	1.7	0	.1%	.0%	.1%	.0%
Phase Three Logic	1.7	.0	1.6	0	.1%	.0%	.1%	.0%
Omaton	1.7	.0	1.7	0	.1%	.0%	.1%	.0%
Caditron	1.6	.8	.6	25	.0%	.1%	.1%	.0%
Schlumberger	1.6	.5	.6	17	.0%	.0%	.0%	.0%
X-TRA	1.6	.3	.7	70	.0%	.0%	.1%	.1%

(Continued)

Table 1 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
National Semiconductor	1.5	.3	1.2	11	.0%	.0%	.1%	.0%
Cooper & Chyan Technology	1.5	.0	1.5	0	.0%	.0%	.1%	.0%
Emerald Design Systems	1.5	.7	.6	24	.0%	.0%	.0%	.0%
Tanner Research	1.4	.0	1.2	0	.0%	.0%	.1%	.0%
Omron	1.4	1.2	.1	39	.0%	.1%	.0%	.0%
DECAD	1.3	.2	.8	5	.0%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.0%	.0%	.1%	.1%
Serbi	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Spectrum Software	1.1	.0	1.1	0	.0%	.0%	.1%	.0%
Intrinsix	1.0	1.0	.0	10	.0%	.1%	.0%	.0%
Object Design	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Cadisys	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Royal Digital Systems	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Number One Systems	.9	.1	.8	23	.0%	.0%	.1%	.0%
Objectivity	.9	.0	.9	0	.0%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.0%	.0%	.0%	.0%
Foresight Resources	.8	.0	.7	0	.0%	.0%	.1%	.0%
DAT Standard Info ssystems	.8	.0	.7	0	.0%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.0%	.0%	.1%	.0%
Inca	.7	.7	.0	3	.0%	.0%	.0%	.0%
ICL	.7	.4	.2	19	.0%	.0%	.0%	.0%
Technische Computer Systeme	.6	.1	.5	17	.0%	.0%	.0%	.0%
CAD Language Systems	.6	.0	.5	0	.0%	.0%	.0%	.0%
Vamp	.6	.0	.6	0	.0%	.0%	.0%	.0%

(Continued)

Table 1 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Capilano Computing	.5	.0	.5	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.4	.0	.4	0	.0%	.0%	.0%	.0%
PLUS Logic	.4	.0	.4	0	.0%	.0%	.0%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.0%	.0%
Andor	.4	.1	.2	3	.0%	.0%	.0%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.0%	.0%
Kontron Instruments	.2	.1	.1	4	.0%	.0%	.0%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.1	1	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Kubota Computer	.1	.1	.0	10	.0%	.0%	.0%	.0%
Dolphin Integration	.1	.0	.1	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 1 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	114.6	106.7	4.7	11,145	3.5%	7.2%	.4%	10.3%
All Companies	3,304.4	1,483.8	1,276.5	108,460	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2,627.1	1,186.1	951.2	95,685	79.5%	79.9%	74.5%	88.2%
All Asian-Based Companies	461.8	249.0	184.7	9,952	14.0%	16.8%	14.5%	9.2%
All European-Based Companies	215.6	48.7	140.6	2,823	6.5%	3.3%	11.0%	2.6%
All Hardware Companies	1,093.1	947.4	.0	88,381	33.1%	63.9%	.0%	81.5%
All Turnkey & SW Companies	2,211.4	536.4	1,276.5	20,080	66.9%	36.1%	100.0%	18.5%

Source: Dataquest (February 1992)

Table 2
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	402.5	115.7	169.1	3,911	18.2%	14.2%	17.2%	8.8%
Sun	319.0	279.4	.0	20,893	14.4%	34.2%	.0%	46.8%
Cadence	206.2	.0	172.2	0	9.3%	.0%	17.6%	.0%
Valid	152.1	5.3	109.6	625	6.9%	.6%	11.2%	1.4%
Intergraph	114.4	28.0	41.1	893	5.2%	3.4%	4.2%	2.0%
Hewlett-Packard	112.9	93.5	.0	7,986	5.1%	11.4%	.0%	17.9%
Zuken	103.9	41.6	62.3	606	4.7%	5.1%	6.4%	1.4%
Racal-Redac	76.7	3.5	59.7	346	3.5%	.4%	6.1%	.8%
Computervision	57.5	20.8	15.3	585	2.6%	2.5%	1.6%	1.3%
NEC	47.6	26.7	17.1	2,464	2.1%	3.3%	1.7%	5.5%
Digital	46.3	29.1	4.0	1,533	2.1%	3.6%	.4%	3.4%
Synopsys	41.9	.0	31.4	0	1.9%	.0%	3.2%	.0%
Siemens Nixdorf Info systems	40.2	19.7	14.1	549	1.8%	2.4%	1.4%	1.2%
Uchida Yoko	36.8	34.9	1.8	584	1.7%	4.3%	.2%	1.3%
Fujitsu	30.5	20.3	7.2	717	1.4%	2.5%	.7%	1.6%
COMPASS Design Automation-VLSI	29.3	.9	24.3	58	1.3%	.1%	2.5%	.1%
Scientific Calc.	28.6	3.0	16.1	105	1.3%	.4%	1.6%	.2%
Seiko Instruments—NO OEM	27.6	11.9	13.0	184	1.2%	1.4%	1.3%	.4%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	1.2%	1.7%	1.3%	.4%
CADIX	22.6	9.0	11.3	166	1.0%	1.1%	1.2%	.4%
Viewlogic Systems	16.2	.0	13.6	0	.7%	.0%	1.4%	.0%
LSI Logic	15.7	1.6	11.8	40	.7%	.2%	1.2%	.1%
HP Cade	15.2	8.9	4.6	66	.7%	1.1%	.5%	.1%
Toshiba—NO OEM	14.9	7.4	6.0	135	.7%	.9%	.6%	.3%

(Continued)

Table 2 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Quickturn Systems	14.0	14.0	.0	75	.6%	1.7%	.0%	.2%
Logic Automation	13.9	.0	13.9	0	.6%	.0%	1.4%	.0%
EEsof	11.9	.1	10.3	15	.5%	.0%	1.1%	.0%
Analogy	10.0	.0	9.0	0	.5%	.0%	.9%	.0%
Comdisco Systems	9.8	.0	8.8	0	.4%	.0%	.9%	.0%
Silvar-Lisco	9.5	.0	5.2	0	.4%	.0%	.5%	.0%
Ascent Logic Corp.	7.5	.0	6.0	0	.3%	.0%	.6%	.0%
Teradyne	7.3	1.1	4.7	26	.3%	.1%	.5%	.1%
Vantage Analysis Systems	7.0	.0	6.0	0	.3%	.0%	.6%	.0%
Genrad	6.7	1.3	4.5	65	.3%	.2%	.5%	.1%
Meta-Software	6.0	.0	5.2	0	.3%	.0%	.5%	.0%
Test Systems Strategies	5.6	.0	4.8	0	.3%	.0%	.5%	.0%
Cascade Design Automation	5.5	.0	3.9	0	.3%	.0%	.4%	.0%
i-Logix	5.5	.0	5.5	0	.2%	.0%	.6%	.0%
Hitachi	5.3	2.5	2.2	109	.2%	.3%	.2%	.2%
Sony	5.2	4.6	.0	304	.2%	.6%	.0%	.7%
Tokyo Electron—NO OEM	4.7	1.6	2.3	17	.2%	.2%	.2%	.0%
AnaCAD	4.5	.0	4.5	0	.2%	.0%	.5%	.0%
Solbourne	4.5	4.4	.0	921	.2%	.5%	.0%	2.1%
Quad Design Technology	4.3	.0	4.0	0	.2%	.0%	.4%	.0%
Contec Microelectronics	4.0	.0	3.6	0	.2%	.0%	.4%	.0%
Sagantec	4.0	.0	3.6	0	.2%	.0%	.4%	.0%
Ontos	3.8	.0	3.8	0	.2%	.0%	.4%	.0%
Pacific Numerics	3.8	.0	3.8	0	.2%	.0%	.4%	.0%

(Continued)

Table 2 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Scientific & Engineering SW	3.5	.0	3.5	0	.2%	.0%	.4%	.0%
EPIC Design Technology	3.5	.0	3.1	0	.2%	.0%	.3%	.0%
Aucotec	3.4	1.2	1.9	39	.2%	.1%	.2%	.1%
Century Research Center	3.3	1.8	1.2	19	.1%	.2%	.1%	.0%
Quantic Laboratories	2.9	.0	2.7	0	.1%	.0%	.3%	.0%
IBM	2.8	1.5	.6	87	.1%	.2%	.1%	.2%
Motorola	2.5	.0	2.5	0	.1%	.0%	.3%	.0%
ACTEL	2.5	.0	2.3	0	.1%	.0%	.2%	.0%
Wacom	2.5	.6	1.9	25	.1%	.1%	.2%	.1%
Integrated Silicon Systems	2.5	.3	2.1	10	.1%	.0%	.2%	.0%
Data I/O	2.4	.0	2.4	0	.1%	.0%	.2%	.0%
Autodesk	2.4	.0	2.4	0	.1%	.0%	.2%	.0%
Sophia Systems	2.2	.5	1.4	17	.1%	.1%	.1%	.0%
debis Systemhaus	1.8	.5	1.1	11	.1%	.1%	.1%	.0%
Xilinx	1.8	.0	1.6	0	.1%	.0%	.2%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.2%	.0%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.1%	.2%	.0%	.2%
Cooper & Chyan Technology	1.5	.0	1.5	0	.1%	.0%	.1%	.0%
Emerald Design Systems	1.5	.7	.6	24	.1%	.1%	.1%	.1%
Compact Software	1.4	.0	1.4	0	.1%	.0%	.1%	.0%
Omron	1.4	1.2	.1	39	.1%	.1%	.0%	.1%
National Semiconductor	1.3	.3	1.1	11	.1%	.0%	.1%	.0%
SIMUCAD	1.3	.0	1.3	0	.1%	.0%	.1%	.0%
DECAD	1.3	.2	.8	4	.1%	.0%	.1%	.0%

(Continued)

Table 2 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Schlumberger	1.2	.3	.4	11	.1%	.0%	.0%	.0%
Object Design	1.0	.0	1.0	0	.0%	.0%	.1%	.0%
Royal Digital Systems	1.0	.0	.9	0	.0%	.0%	.1%	.0%
Objectivity	.9	.0	.9	0	.0%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.0%	.0%	.0%	.0%
Microsim	.9	.0	.8	0	.0%	.0%	.1%	.0%
Everex Systems	.8	.8	.0	90	.0%	.1%	.0%	.2%
ICL	.7	.4	.2	19	.0%	.1%	.0%	.0%
CAD Language Systems	.6	.0	.5	0	.0%	.0%	.0%	.0%
Infinite Graphics	.5	.0	.5	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.0%	.0%
Phase Three Logic	.5	.0	.4	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.5	.1	.4	12	.0%	.0%	.0%	.0%
ISDATA	.4	.0	.4	0	.0%	.0%	.0%	.0%
ALS Design	.3	.0	.3	0	.0%	.0%	.0%	.0%
Inca	.2	.2	.0	1	.0%	.0%	.0%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	7	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 2 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2,213.9	817.3	980.9	44,675	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,726.5	602.0	748.2	37,961	78.0%	73.7%	76.3%	85.0%
All Asian-Based Companies	337.0	180.3	140.8	5,650	15.2%	22.1%	14.4%	12.6%
All European-Based Companies	150.3	35.1	91.9	1,064	6.8%	4.3%	9.4%	2.4%
All Hardware Companies	497.6	426.1	.0	31,802	22.5%	52.1%	.0%	71.2%
All Turnkey & SW Companies	1,716.3	391.3	980.9	12,873	77.5%	47.9%	100.0%	28.8%

Source: Dataquest (February 1992)

Table 3
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	123.4	87.9	1.0	0	36.7%	39.6%	1.7%	.0%
IBM	42.8	24.0	10.3	654	12.7%	10.8%	18.2%	14.3%
Fujitsu	30.4	20.3	7.1	515	9.1%	9.1%	12.6%	11.3%
Cadence	19.7	.0	15.4	0	5.9%	.0%	27.3%	.0%
Intergraph	12.1	6.0	1.9	113	3.6%	2.7%	3.4%	2.5%
Teradyne	6.3	.9	3.9	4	1.9%	.4%	7.0%	.1%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	1.0%	.6%	2.0%	.3%
Scientific Calc.	3.1	.7	2.4	18	.9%	.3%	4.3%	.4%
COMPASS Design Automation-VLSI	2.5	2.3	3.7	8	.8%	1.1%	6.6%	.2%
LSI Logic	1.8	.2	1.3	4	.5%	.1%	2.3%	.1%
Hitachi	1.7	.8	.7	30	.5%	.4%	1.3%	.7%
Compact Software	.9	.0	.9	0	.3%	.0%	1.6%	.0%
Meta-Software	.8	.0	.7	0	.2%	.0%	1.2%	.0%
EEsof	.8	.0	.7	0	.2%	.0%	1.3%	.0%
Genrad	.8	.2	.5	2	.2%	.1%	.9%	.0%
Data I/O	.7	.0	.7	0	.2%	.0%	1.2%	.0%
Test Systems Strategies	.6	.0	.6	0	.2%	.0%	1.1%	.0%
CADAM	.6	.0	.5	0	.2%	.0%	.9%	.0%
Analogy	.5	.0	.5	0	.2%	.0%	.9%	.0%
Computervision	.4	.1	.1	10	.1%	.0%	.1%	.2%
Schlumberger	.3	.1	.1	.5	.1%	.0%	.2%	.1%
debis Systemhaus	.3	.1	.2	2	.1%	.0%	.3%	.0%
Logic Automation	.3	.0	.3	0	.1%	.0%	.5%	.0%
ISDATA	.2	.0	.1	0	.0%	.0%	.2%	.0%

(Continued)

Table 3 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.2%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.1%	.0%
SIMUCAD	.1	.0	.1	0	.0%	.0%	.1%	.0%
DECAD	.0	.0	.0	1	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	3	.0%	.0%	.0%	.1%
Other Companies	81.3	77.1	1.3	3,185	24.2%	34.7%	2.3%	69.8%
All Companies	335.9	222.1	56.3	4,565	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	299.9	199.4	46.0	4,002	89.3%	89.8%	81.6%	87.7%
All Asian-Based Companies	35.5	22.6	9.0	561	10.6%	10.2%	15.9%	12.3%
All European-Based Companies	.5	.1	1.4	2	.1%	.0%	2.5%	.0%
All Hardware Companies	203.2	165.0	.0	3,185	60.5%	74.3%	.0%	69.8%
All Turnkey & SW Companies	132.7	57.1	56.3	1,380	39.5%	25.7%	100.0%	30.2%

Source: Dataquest (February 1992)

Table 4
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	57.6	41.4	.0	0	30.3%	29.4%	.0%	.0%
Sun	44.8	37.0	.0	1,129	23.6%	26.3%	.0%	43.5%
Zycad	30.0	23.7	.0	230	15.8%	16.8%	.0%	8.9%
Ikos Systems	13.1	13.1	.0	61	6.9%	9.3%	.0%	2.4%
Solbourne	12.0	11.8	.0	485	6.3%	8.4%	.0%	18.7%
Hewlett-Packard	7.7	6.4	.0	377	4.0%	4.5%	.0%	14.5%
Cadence	7.6	.0	7.6	0	4.0%	.0%	51.8%	.0%
Intergraph	7.2	3.6	1.7	73	3.8%	2.5%	11.5%	2.8%
Sharp System Products—NO OEM	4.1	2.1	1.9	18	2.1%	1.5%	13.2%	.7%
IBM	2.3	1.6	.3	210	1.2%	1.1%	2.0%	8.1%
Schlumberger	.2	.1	.1	2	.1%	.0%	.4%	.1%
Sumitomo Denko Workstation	.1	.1	.0	11	.1%	.1%	.0%	.4%
SIMUCAD	.1	.0	.1	0	.0%	.0%	.5%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.3%	.0%
Other Companies	3.3	.0	3.0	0	1.7%	.0%	20.1%	.0%
All Companies	190.0	140.9	14.7	2,595	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	185.8	138.6	12.8	2,566	97.8%	98.4%	86.8%	98.9%
All Asian-Based Companies	4.2	2.2	1.9	29	2.2%	1.6%	13.2%	1.1%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	135.9	110.5	.0	2,255	71.5%	78.5%	.0%	86.9%
All Turnkey & SW Companies	54.1	30.4	14.7	340	28.5%	21.5%	100.0%	13.1%

Source: Dataquest (February 1992)

Table 5
1991 Preliminary CAD/CAM/CAE Market Share

Company	Application: Platform: Region: Units:	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Market Share			
							Hardware Revenue	Software Revenue	Hardware Units Shipped	
Compaq	Electronic Design Automation	119.8	119.8	.0	20,491	21.2%	39.5%	.0%	36.2%	
IBM	Personal Computer	42.4	40.3	.0	9,929	7.5%	13.3%	.0%	17.5%	
Wacom	Worldwide	34.2	6.7	23.7	578	6.0%	2.2%	10.5%	1.0%	
NEC		31.0	26.3	2.2	2,473	5.5%	8.7%	1.0%	4.4%	
Hewlett-Packard		30.7	24.5	.0	5,303	5.4%	8.1%	.0%	9.4%	
Viewlogic Systems		20.3	.0	17.1	0	3.6%	.0%	7.6%	.0%	
Autodesk		19.9	.0	19.9	0	3.5%	.0%	8.9%	.0%	
Apple Computer		18.5	16.3	.0	3,880	3.3%	5.4%	.0%	6.9%	
Xilinx		16.2	.0	14.6	0	2.9%	.0%	6.5%	.0%	
LPKF		14.4	4.0	9.0	620	2.6%	1.3%	4.0%	1.1%	
Altera		13.7	.0	11.6	0	2.4%	.0%	5.2%	.0%	
Fujitsu		12.3	8.2	2.9	404	2.2%	2.7%	1.3%	.7%	
Orcad		10.5	.0	10.5	0	1.9%	.0%	4.7%	.0%	
ACTEL		10.0	.0	9.0	0	1.8%	.0%	4.0%	.0%	
Data I/O		9.6	.0	9.6	0	1.7%	.0%	4.3%	.0%	
CADAM		9.0	4.2	4.1	596	1.6%	1.4%	1.8%	1.1%	
PADS Software		8.7	.0	7.4	0	1.5%	.0%	3.3%	.0%	
Racal-Redac		8.3	.0	7.9	0	1.5%	.0%	3.5%	.0%	
Aucotec		8.0	2.8	4.4	142	1.4%	.9%	2.0%	.3%	
EEsof		7.8	.0	7.0	0	1.4%	.0%	3.1%	.0%	
Microsim		7.6	.0	7.1	0	1.3%	.0%	3.2%	.0%	
Ziegler		7.3	.0	7.3	0	1.3%	.0%	3.2%	.0%	
Everex Systems		6.2	6.2	.0	1,980	1.1%	2.0%	.0%	3.5%	
BETRONEX		5.5	.5	5.1	86	1.0%	.2%	2.2%	.2%	

(Continued)

Table 5 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Platform: Region: Units:	Electronic Design Automation Personal Computer Worldwide Millions of U.S. Dollars/Actual Units									
Market Share										
Company	Total		Hardware		Software		Hardware		Total	
	Factory	Revenue	Revenue	Units	Revenue	Revenue	Revenue	Units	Factory	Revenue
Sophia Systems	3.8		.9	68	2.5				.7%	
Dell Computer	3.8		3.8	977	.0				.7%	
Kloekner-Moeller	3.7		.9	130	2.6				.7%	
Hitachi	3.6		1.7	186	1.5				.6%	
Research Machines	2.9		2.9	460	.0				.5%	
Accel Technologies	2.7		.0	0	2.4				.5%	
ALDEC	2.5		.0	0	2.5				.4%	
Visionics	2.4		.0	10	1.8				.4%	
ALS Design	2.4		.2	50	2.2				.4%	
Teradyne	2.2		.0	0	1.7				.4%	
CAD-UL	2.1		.0	0	2.1				.4%	
Infinite Graphics	2.0		.0	0	2.0				.4%	
Massteck	1.8		.0	0	1.8				.3%	
Omaton	1.7		.0	0	1.7				.3%	
X-TRA	1.6		.3	70	.7				.3%	
Caditron	1.6		.8	25	.6				.3%	
ISDATA	1.4		.0	0	1.2				.2%	
Tanner Research	1.4		.0	0	1.2				.2%	
Compact Software	1.3		.0	0	.5				.2%	
Phase Three Logic	1.3		.0	0	1.1				.2%	
Aucos elektronische Gerate	1.2		.4	116	.8				.2%	
Spectrum Software	1.1		.0	0	1.1				.2%	
Serbi	1.1		.0	0	1.1				.2%	
Intrinsix	1.0		1.0	10	.0				.2%	
										(Continued)

(Continued)

Table 5 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadisy	1.0	.0	1.0	0	.2%	.0%	.4%	.0%
Number One Systems	.9	.1	.8	23	.2%	.0%	.4%	.0%
Foresight Resources	.8	.0	.7	0	.1%	.0%	.3%	.0%
DAT Standard info ssystems	.8	.0	.7	0	.1%	.0%	.3%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.3%	.0%
Scientific Calc.	.6	.0	.6	0	.1%	.0%	.3%	.0%
Digital	.6	.0	.4	0	.1%	.0%	.2%	.0%
Integrated Silicon Systems	.6	.2	.4	8	.1%	.1%	.2%	.0%
Vamp	.6	.0	.6	0	.1%	.0%	.2%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.2%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%
American Small Business Comp.	.4	.0	.4	0	.1%	.0%	.2%	.0%
PLUS Logic	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
Andor	.4	.1	.2	3	.1%	.0%	.1%	.0%
debt Systemhaus	.3	.1	.2	6	.1%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
Kontron Instruments	.2	.1	.1	4	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Genrad	.2	.0	.2	10	.0%	.0%	.1%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.1%	.0%

(Continued)

Table 5 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company	Total				Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.2	.0	.2	5	.0%	.0%	.1%	.0%
Pacific Numerics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
National Semiconductor	.2	.0	.2	0	.0%	.0%	.1%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.1	1	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	30.2	29.8	.4	7,961	5.3%	9.8%	.2%	14.1%
All Companies	564.8	303.5	224.5	56,625	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	414.9	246.1	144.3	51,156	73.5%	81.1%	64.3%	90.3%
All Asian-Based Companies	85.1	43.9	33.0	3,712	15.1%	14.5%	14.7%	6.6%
All European-Based Companies	64.8	13.5	47.3	1,758	11.5%	4.5%	21.1%	3.1%
All Hardware Companies	256.4	245.8	.0	51,139	45.4%	81.0%	.0%	90.3%
All Turnkey & SW Companies	308.4	57.7	224.5	5,487	54.6%	19.0%	100.0%	9.7%

Source: Dataquest (February 1992)

Table 6
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	194.0	56.3	81.5	1,884	14.4%	9.7%	15.6%	4.1%
Sun	189.5	164.9	.0	12,298	14.1%	28.5%	.0%	26.9%
Cadence	118.9	.0	89.2	0	8.8%	.0%	17.1%	.0%
Digital	111.6	76.3	4.4	736	8.3%	13.2%	.8%	1.6%
Valid	84.1	4.2	59.7	554	6.2%	.7%	11.4%	1.2%
Intergraph	61.7	20.7	19.1	527	4.6%	3.6%	3.7%	1.2%
Hewlett-Packard	57.6	47.7	.0	5,203	4.3%	8.2%	.0%	11.4%
Compaq	51.5	51.5	.0	8,811	3.8%	8.9%	.0%	19.3%
Viewlogic Systems	26.7	.0	22.4	0	2.0%	.0%	4.3%	.0%
Synopsys	25.1	.0	18.8	0	1.9%	.0%	3.6%	.0%
IBM	24.7	18.9	2.8	3,234	1.8%	3.3%	.5%	7.1%
Racal-Redac	23.7	1.1	19.3	99	1.8%	.2%	3.7%	.2%
Zycad	19.5	15.4	.0	150	1.4%	2.7%	.0%	.3%
COMPASS Design Automation-VLSI	14.9	1.5	13.2	31	1.1%	.3%	2.5%	.1%
Computervision	14.7	4.0	3.7	167	1.1%	.7%	.7%	.4%
Solbourne	13.4	13.3	.0	1,143	1.0%	2.3%	.0%	2.5%
Xilinx	11.7	.0	10.5	0	.9%	.0%	2.0%	.0%
Apple Computer	11.5	10.1	.0	2,406	.9%	1.7%	.0%	5.3%
Scientific Calc.	10.9	1.6	6.4	44	.8%	.3%	1.2%	.1%
LSI Logic	10.5	1.0	7.9	26	.8%	.2%	1.5%	.1%
Teradyne	9.9	1.2	6.4	19	.7%	.2%	1.2%	.0%
Autodesk	9.6	.0	9.6	0	.7%	.0%	1.8%	.0%
EEsof	9.2	.1	8.1	7	.7%	.0%	1.6%	.0%
Logic Automation	9.2	.0	9.2	0	.7%	.0%	1.8%	.0%

(Continued)

Table 6 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue	
Quickturn Systems	9.1	9.1	.0	.7%	1.6%	.0%	.1%
Altera	7.9	.0	6.7	.6%	.0%	1.3%	.0%
Ikos Systems	7.8	7.8	.0	.6%	1.4%	.0%	.1%
ACTEL	7.8	.0	7.0	.6%	.0%	1.3%	.0%
Ascent Logic Corp.	7.5	.0	6.0	.6%	.0%	1.2%	.0%
Everex Systems	6.3	6.3	.0	.5%	1.1%	.0%	.4%
Comdisco Systems	6.3	.0	5.6	.5%	.0%	1.1%	.0%
Microsim	5.8	.0	5.4	.4%	.0%	1.0%	.0%
Data I/O	5.4	.0	5.4	.4%	.0%	1.0%	.0%
Zuken	5.2	2.1	3.1	.4%	.4%	.6%	.1%
Meta-Software	5.1	.0	4.5	.4%	.0%	.9%	.0%
Analogy	4.7	.0	4.3	.4%	.0%	.8%	.0%
Quad Design Technology	4.3	.0	4.0	.3%	.0%	.8%	.0%
PADS Software	4.2	.0	3.6	.3%	.0%	.7%	.0%
i-Logix	4.1	.0	4.1	.3%	.0%	.8%	.0%
Vantage Analysis Systems	3.9	.0	3.3	.3%	.0%	.6%	.0%
Test Systems Strategies	3.7	.0	3.2	.3%	.0%	.6%	.0%
Orcad	3.7	.0	3.7	.3%	.0%	.7%	.0%
Ontos	3.6	.0	3.6	.3%	.0%	.7%	.0%
Pacific Numerics	3.6	.0	3.6	.3%	.0%	.7%	.0%
Genrad	3.5	.7	2.3	.3%	.1%	.4%	.1%
Cascade Design Automation	3.3	.0	2.3	.2%	.0%	.4%	.0%
EPIC Design Technology	3.1	.0	2.8	.2%	.0%	.5%	.0%
CADAM	2.9	1.3	1.4	.2%	.2%	.3%	.4%

(Continued)

Table 6 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Infinite Graphics	2.5	.0	2.5	0	.2%	.0%	.5%	.0%
Dell Computer	2.5	2.5	.0	649	.2%	.4%	.0%	1.4%
Silvar-Lisco	2.5	.0	1.4	0	.2%	.0%	.3%	.0%
Scientific & Engineering SW.	2.5	.0	2.5	0	.2%	.0%	.5%	.0%
Visionics	2.4	.0	1.8	10	.2%	.0%	.3%	.0%
Quantic Laboratories	2.3	.0	2.1	0	.2%	.0%	.4%	.0%
Accel Technologies	2.2	.0	2.0	0	.2%	.0%	.4%	.0%
Motorola	2.1	.0	2.1	0	.2%	.0%	.4%	.0%
ALDEC	1.9	.0	1.9	0	.1%	.0%	.4%	.0%
LPKF	1.8	1.2	.5	75	.1%	.2%	.1%	.2%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.3%	.0%
Integrated Silicon Systems	1.8	.3	1.4	10	.1%	.1%	.3%	.0%
Phase Three Logic	1.7	.0	1.6	0	.1%	.0%	.3%	.0%
Contec Microelectronics	1.6	.0	1.4	0	.1%	.0%	.3%	.0%
SIMUCAD	1.5	.0	1.4	0	.1%	.0%	.3%	.0%
Emerald Design Systems	1.5	.7	.6	24	.1%	.1%	.1%	.1%
Cooper & Chyan Technology	1.5	.0	1.5	0	.1%	.0%	.3%	.0%
Compact Software	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
Massteck	1.2	.0	1.2	0	.1%	.0%	.2%	.0%
BETRONEX	1.2	.1	1.0	22	.1%	.0%	.2%	.0%
Tanner Research	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Omaton	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Spectrum Software	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.2%	.0%	.0%

(Continued)

Table 6 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadisy	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
National Semiconductor	.9	.2	.7	7	.1%	.0%	.1%	.0%
Royal Digital Systems	.8	.0	.7	0	.1%	.0%	.1%	.0%
Schlumberger	.8	.3	.3	8	.1%	.0%	.1%	.0%
Object Design	.8	.0	.8	0	.1%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.1%	.0%
Objectivity	.7	.0	.7	0	.1%	.0%	.1%	.0%
Vamp	.6	.0	.6	0	.0%	.0%	.1%	.0%
Capilano Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
Foresight Resources	.5	.0	.4	0	.0%	.0%	.1%	.0%
PLUS Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
CAD Language Systems	.3	.0	.3	0	.0%	.0%	.1%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 6 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	58.3	55.8	.4	5,370	4.3%	9.6%	.1%	11.7%
All Companies	1,347.9	578.9	521.4	45,717	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,316.0	574.4	497.5	45,490	97.6%	99.2%	95.4%	99.5%
All Asian-Based Companies	5.2	2.1	3.1	30	.4%	.4%	.6%	.1%
All European-Based Companies	26.7	2.4	20.8	196	2.0%	.4%	4.0%	.4%
All Hardware Companies	527.3	458.7	.0	41,783	39.1%	79.2%	.0%	91.4%
All Turnkey & SW Companies	820.5	120.3	521.4	3,934	60.9%	20.8%	100.0%	8.6%

Source: Dataquest (February 1992)

Table 7
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	194.0	56.3	81.5	1,884	21.7%	18.9%	20.0%	9.4%
Sun	166.2	145.6	.0	11,779	18.6%	48.9%	.0%	58.9%
Cadence	105.7	.0	79.3	0	11.8%	.0%	19.5%	.0%
Valid	84.1	4.2	59.7	554	9.4%	1.4%	14.7%	2.8%
Intergraph	50.1	14.9	16.9	416	5.6%	5.0%	4.2%	2.1%
Hewlett-Packard	44.0	36.6	.0	3,242	4.9%	12.3%	.0%	16.2%
Synopsys	25.1	.0	18.8	0	2.8%	.0%	4.6%	.0%
Digital	23.9	14.2	3.2	736	2.7%	4.8%	.8%	3.7%
Racal-Redac	20.6	1.1	16.4	99	2.3%	.4%	4.0%	.5%
Computervision	14.6	3.9	3.7	166	1.6%	1.3%	.9%	.8%
COMPASS Design Automation-VLSI	13.7	.4	11.4	27	1.5%	.1%	2.8%	.1%
Viewlogic Systems	11.8	.0	9.9	0	1.3%	.0%	2.4%	.0%
LSI Logic	9.4	.9	7.1	24	1.1%	.3%	1.7%	.1%
Quickturn Systems	9.1	9.1	.0	49	1.0%	3.1%	.0%	.2%
Logic Automation	9.0	.0	9.0	0	1.0%	.0%	2.2%	.0%
Scientific Calc.	8.9	1.1	4.8	33	1.0%	.4%	1.2%	.2%
Ascent Logic Corp.	7.5	.0	6.0	0	.8%	.0%	1.5%	.0%
Comdisco Systems	6.5	.0	5.6	0	.7%	.0%	1.4%	.0%
EEsof	5.4	.1	4.7	7	.6%	.0%	1.1%	.0%
Zuken	5.2	2.1	3.1	30	.6%	.7%	.8%	.2%
Teradyne	4.5	.7	2.9	16	.5%	.2%	.7%	.1%
Analogy	4.5	.0	4.1	0	.5%	.0%	1.0%	.0%

(Continued)

Table 7 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Meta-Software	4.5	.0	3.9	0	.5%	.0%	1.0%	.0%
Quad Design Technology	4.3	.0	4.0	0	.5%	.0%	1.0%	.0%
i-Logix	4.1	.0	4.1	0	.5%	.0%	1.0%	.0%
Vantage Analysis Systems	3.9	.0	3.3	0	.4%	.0%	.8%	.0%
Solbourne	3.7	3.7	.0	748	.4%	1.2%	.0%	3.7%
Ontos	3.6	.0	3.6	0	.4%	.0%	.9%	.0%
Pacific Numerics	3.4	.0	3.4	0	.4%	.0%	.8%	.0%
Test Systems Strategies	3.4	.0	2.9	0	.4%	.0%	.7%	.0%
Cascade Design Automation	3.3	.0	2.3	0	.4%	.0%	.6%	.0%
EPIC Design Technology	3.1	.0	2.8	0	.3%	.0%	.7%	.0%
Genrad	3.0	.6	2.0	29	.3%	.2%	.5%	.1%
Silvar-Lisco	2.5	.0	1.4	0	.3%	.0%	.3%	.0%
Scientific & Engineering SW	2.5	.0	2.5	0	.3%	.0%	.6%	.0%
Quantic Laboratories	2.3	.0	2.1	0	.3%	.0%	.5%	.0%
Motorola	2.1	.0	2.1	0	.2%	.0%	.5%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.2%	.0%	.4%	.0%
Contec Microelectronics	1.6	.0	1.4	0	.2%	.0%	.4%	.0%
ACTEL	1.6	.0	1.4	0	.2%	.0%	.3%	.0%
Cooper & Chyan Technology	1.5	.0	1.5	0	.2%	.0%	.4%	.0%
Emerald Design Systems	1.5	.7	.6	24	.2%	.2%	.2%	.1%
Integrated Silicon Systems	1.4	.2	1.2	6	.2%	.1%	.3%	.0%
Xilinx	1.2	.0	1.1	0	.1%	.0%	.3%	.0%

(Continued)

Table 7 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
SIMUCAD	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Data I/O	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Autodesk	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
Royal Digital Systems	.8	.0	.7	0	.1%	.0%	.2%	.0%
National Semiconductor	.8	.2	.6	7	.1%	.1%	.2%	.0%
Object Design	.8	.0	.8	0	.1%	.0%	.2%	.0%
Objectivity	.7	.0	.7	0	.1%	.0%	.2%	.0%
IBM	.7	.4	.2	24	.1%	.1%	.0%	.1%
Everex Systems	.7	.7	.0	81	.1%	.2%	.0%	.4%
Compact Software	.6	.0	.6	0	.1%	.0%	.1%	.0%
Microsim	.6	.0	.5	0	.1%	.0%	.1%	.0%
Schlumberger	.6	.2	.2	5	.1%	.1%	.1%	.0%
Infinite Graphics	.5	.0	.5	0	.1%	.0%	.1%	.0%
Phase Three Logic	.5	.0	.4	0	.1%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.0%	.0%	.1%	.0%
CAD Language Systems	.3	.0	.3	0	.0%	.0%	.1%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 7 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.1	.0	0	.0%	.0%	.0%	.0%
All Companies	895.1	297.9	406.8	19,985	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	869.3	294.7	387.3	19,856	97.1%	98.9%	95.2%	99.4%
All Asian-Based Companies	5.2	2.1	3.1	30	.6%	.7%	.8%	.2%
All European-Based Companies	20.6	1.1	16.4	99	2.3%	.4%	4.0%	.5%
All Hardware Companies	243.3	209.9	.0	16,634	27.2%	70.4%	.0%	83.2%
All Turnkey & SW Companies	651.8	88.0	406.8	3,351	72.8%	29.6%	100.0%	16.8%

Source: Dataquest (February 1992)

Table 8
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	59.7	42.2	.8	0	40.7%	44.0%	3.3%	.0%
Cadence	13.2	.0	9.9	0	9.0%	.0%	41.4%	.0%
IBM	10.7	6.0	2.6	169	7.3%	6.2%	10.8%	8.5%
Intergraph	7.2	3.6	1.2	66	4.9%	3.8%	4.8%	3.3%
Teradyne	4.0	.6	2.4	2	2.7%	.6%	10.2%	.1%
Scientific Calc.	2.0	.4	1.6	11	1.4%	.5%	6.5%	.6%
COMPASS Design Automation-VLSI	1.2	1.1	1.8	4	.8%	1.1%	7.4%	.2%
LSI Logic	1.1	.1	.8	2	.7%	.1%	3.4%	.1%
Meta-Software	.6	.0	.5	0	.4%	.0%	2.2%	.0%
EEsof	.4	.0	.3	0	.3%	.0%	1.4%	.0%
Compact Software	.4	.0	.4	0	.2%	.0%	1.5%	.0%
Test Systems Strategies	.4	.0	.4	0	.2%	.0%	1.5%	.0%
Genrad	.3	.1	.2	1	.2%	.1%	1.0%	.1%
Data I/O	.3	.0	.3	0	.2%	.0%	1.2%	.0%
Analogy	.2	.0	.2	0	.2%	.0%	.9%	.0%
Logic Automation	.2	.0	.2	0	.1%	.0%	.8%	.0%
CADAM	.2	.0	.2	0	.1%	.0%	.6%	.0%
Schlumberger	.1	.0	.1	2	.1%	.0%	.3%	.1%
Computervision	.1	.0	.0	1	.1%	.0%	.1%	.1%
SIMUCAD	.1	.0	.1	0	.0%	.0%	.3%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.2%	.0%

(Continued)

Table 8 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Host-Dependent
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	44.1	41.9	.1	1,731	30.2%	43.6%	.3%	86.9%
All Companies	146.4	96.0	23.9	1,991	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	146.4	96.0	23.9	1,991	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	102.7	84.1	.0	1,731	70.1%	87.6%	.0%	86.9%
All Turnkey & SW Companies	43.7	12.0	23.9	260	29.9%	12.4%	100.0%	13.1%

Source: Dataquest (February 1992)

Table 9
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	27.6	19.9	.0	0	28.7%	25.7%	.0%	.0%
Sun	23.3	19.3	.0	520	24.2%	24.9%	.0%	38.0%
Zycad	19.5	15.4	.0	150	20.2%	19.9%	.0%	10.9%
Solbourne	9.7	9.6	.0	394	10.1%	12.4%	.0%	28.9%
Ikos Systems	7.8	7.8	.0	37	8.1%	10.1%	.0%	2.7%
Intergraph	4.3	2.2	1.0	45	4.5%	2.8%	85.2%	3.3%
Hewlett-Packard	3.3	2.7	.0	158	3.4%	3.5%	.0%	11.6%
IBM	.6	.5	.1	63	.6%	.6%	6.6%	4.6%
Schlumberger	.1	.0	.0	1	.1%	.0%	2.5%	.1%
SIMUCAD	.1	.0	.1	0	.1%	.0%	5.7%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	96.3	77.3	1.2	1,366	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	96.3	77.3	1.2	1,366	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	72.0	59.5	.0	1,170	74.7%	77.0%	.0%	85.6%
All Turnkey & SW Companies	24.3	17.8	1.2	197	25.3%	23.0%	100.0%	14.4%

Source: Dataquest (February 1992)

Table 10
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue						
Compaq	51.5	51.5	.0	8,811	24.5%	47.8%	.0%	47.8%	39,4%					
Viewlogic Systems	14.8	.0	12.5	0	7.1%	.0%	13.9%	.0%	.0%					
IBM	12.7	12.1	.0	2,979	6.1%	11.2%	.0%	11.2%	13.3%					
Apple Computer	11.5	10.1	.0	2,406	5.5%	9.4%	.0%	9.4%	10.8%					
Xilinx	10.5	.0	9.5	0	5.0%	.0%	10.6%	.0%	.0%					
Hewlett-Packard	10.4	8.4	.0	1,803	5.0%	7.8%	.0%	7.8%	8.1%					
Autodesk	8.6	.0	8.6	0	4.1%	.0%	9.6%	.0%	.0%					
Altera	7.9	.0	6.7	0	3.8%	.0%	7.5%	.0%	.0%					
ACTEL	6.2	.0	5.6	0	3.0%	.0%	6.2%	.0%	.0%					
Everex Systems	5.6	5.6	.0	1,782	2.7%	5.2%	.0%	5.2%	8.0%					
Microsim	5.1	.0	4.8	0	2.4%	.0%	5.4%	.0%	.0%					
PADS Software	4.2	.0	3.6	0	2.0%	.0%	4.0%	.0%	.0%					
Data I/O	4.1	.0	4.1	0	2.0%	.0%	4.6%	.0%	.0%					
Orcad	3.7	.0	3.7	0	1.8%	.0%	4.1%	.0%	.0%					
EEsof	3.5	.0	3.2	0	1.7%	.0%	3.5%	.0%	.0%					
Racal-Redac	3.1	.0	2.9	0	1.5%	.0%	3.3%	.0%	.0%					
CADAM	2.7	1.3	1.2	178	1.3%	1.2%	1.4%	1.2%	.8%					
Dell Computer	2.5	2.5	.0	649	1.2%	2.3%	.0%	2.3%	2.9%					
Visionics	2.4	.0	1.8	10	1.2%	.0%	2.0%	.0%	.0%					
Accel Technologies	2.2	.0	2.0	0	1.0%	.0%	2.2%	.0%	.0%					
Infinite Graphics	2.0	.0	2.0	0	1.0%	.0%	2.2%	.0%	.0%					
ALDEC	1.9	.0	1.9	0	.9%	.0%	2.1%	.0%	.0%					
LPKF	1.8	1.2	.5	75	.9%	1.1%	.5%	1.1%	.3%					
Teradyne	1.4	.0	1.0	0	.7%	.0%	1.2%	.0%	.0%					

(Continued)

Table 10 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Personal Computer
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Phase Three Logic	1.3	.0	1.1	0	.6%	.0%	1.3%	.0%
Massteck	1.2	.0	1.2	0	.6%	.0%	1.4%	.0%
BETRONEX	1.2	.1	1.0	22	.5%	.1%	1.2%	.1%
Tanner Research	1.1	.0	1.0	0	.5%	.0%	1.1%	.0%
Omaton	1.1	.0	1.1	0	.5%	.0%	1.2%	.0%
Spectrum Software	1.0	.0	1.0	0	.5%	.0%	1.1%	.0%
Intrinsix	1.0	1.0	.0	10	.5%	.9%	.0%	.0%
CadisyS	1.0	.0	1.0	0	.5%	.0%	1.1%	.0%
Douglas Electronics	.8	.0	.8	0	.4%	.0%	.8%	.0%
Vamp	.6	.0	.6	0	.3%	.0%	.6%	.0%
Compact Software	.5	.0	.5	0	.2%	.0%	.6%	.0%
Capilano Computing	.5	.0	.5	0	.2%	.0%	.5%	.0%
Digital	.5	.0	.3	0	.2%	.0%	.4%	.0%
Foresight Resources	.5	.0	.4	0	.2%	.0%	.4%	.0%
PLUS Logic	.4	.0	.4	0	.2%	.0%	.5%	.0%
American Small Business Comp.	.4	.0	.4	0	.2%	.0%	.4%	.0%
The CAD Group	.4	.0	.4	0	.2%	.0%	.4%	.0%
Integrated Silicon Systems	.4	.1	.2	5	.2%	.1%	.3%	.0%
BV Engineering	.4	.0	.4	0	.2%	.0%	.4%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.1%	.0%	.3%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.2%	.0%
SIMUCAD	.2	.0	.2	0	.1%	.0%	.2%	.0%
Innovative Data Design	.2	.0	.2	0	.1%	.0%	.2%	.0%
Pacific Numerics	.2	.0	.2	0	.1%	.0%	.2%	.0%

(Continued)

Table 10 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Simutest	.2	.0	.2	0	.1%	.0%	.2%	.0%
Cascade Graphics	.2	.0	.2	0	.1%	.0%	.2%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	14.1	13.8	.3	3,639	6.7%	12.8%	.3%	16.3%
All Companies	210.0	107.7	89.6	22,374	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	203.9	106.4	85.1	22,277	97.1%	98.8%	95.1%	99.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	6.1	1.3	4.4	97	2.9%	1.2%	4.9%	.4%
All Hardware Companies	109.3	105.2	.0	22,248	52.0%	97.7%	.0%	99.4%
All Turnkey & SW Companies	100.7	2.5	89.6	126	48.0%	2.3%	100.0%	.6%

Source: Dataquest (February 1992)

Table 11
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share				
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	114.0	32.0	47.9	1,107	11.9%	7.2%	14.6%	3.1%
Sun	99.8	86.9	.0	4,714	10.5%	19.4%	.0%	13.1%
Digital	88.3	63.1	.0	613	9.2%	14.1%	.0%	1.7%
Hewlett-Packard	65.0	53.2	.0	5,874	6.8%	11.9%	.0%	16.4%
Compaq	58.7	58.7	.0	10,041	6.1%	13.1%	.0%	28.0%
Intergraph	51.6	11.3	18.5	391	5.4%	2.5%	5.6%	1.1%
Racal-Redac	40.3	1.5	32.9	162	4.2%	.3%	10.0%	.5%
Siemens Nixdorf Info systems	38.6	19.0	13.5	527	4.0%	4.2%	4.1%	1.5%
Computervision	37.5	14.7	9.0	360	3.9%	3.3%	2.7%	1.0%
IBM	35.3	26.5	4.3	4,325	3.7%	5.9%	1.3%	12.1%
Cadence	34.6	.0	26.0	0	3.6%	.0%	7.9%	.0%
Valid	32.0	1.1	20.4	71	3.4%	.2%	6.2%	.2%
HP Cade	15.2	8.9	4.6	66	1.6%	2.0%	1.4%	.2%
Scientific Calc.	14.0	1.1	8.5	49	1.5%	.2%	2.6%	.1%
COMPASS Design Automation-VLSI	13.7	1.4	12.1	28	1.4%	.3%	3.7%	.1%
IPKF	12.0	2.4	8.4	520	1.3%	.5%	2.6%	1.4%
Aucotec	11.4	4.0	6.3	181	1.2%	.9%	1.9%	.5%
Autodesk	10.0	.0	10.0	0	1.0%	.0%	3.1%	.0%
Synopsys	8.4	.0	6.3	0	.9%	.0%	1.9%	.0%
Ziegler	7.3	.0	7.3	0	.8%	.0%	2.2%	.0%
EEsof	7.0	.0	6.2	5	.7%	.0%	1.9%	.0%
Orcad	4.9	.0	4.9	0	.5%	.0%	1.5%	.0%
Apple Computer	4.8	4.2	.0	1,009	.5%	.9%	.0%	2.8%
AnaCAD	4.5	.0	4.5	0	.5%	.0%	1.4%	.0%

(Continued)

Table 11 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Company	Application: Platform: Region: Units:	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Market Share			
							Hardware Revenue	Software Revenue	Hardware Units Shipped	Hardware Units Shipped
Zycad	Electronic Design Automation	4.5	3.6	.0	34	.5%	.8%	.0%	.1%	.1%
Teradyne	All Platforms	4.4	.5	2.8	8	.5%	.1%	.9%	.0%	.0%
LSI Logic	Europe	4.4	.4	3.3	11	.5%	.1%	1.0%	.0%	.0%
Analogy	Millions of U.S. Dollars/Actual Units	4.2	.0	3.8	0	.4%	.0%	1.2%	.0%	.0%
Viewlogic Systems		4.0	.0	3.4	0	.4%	.0%	1.0%	.0%	.0%
Sagantec		4.0	.0	3.6	0	.4%	.0%	1.1%	.0%	.0%
Kloeckner-Moeller		3.7	.9	2.6	130	.4%	.2%	.8%	.4%	.4%
Altera		3.7	.0	3.1	0	.4%	.0%	1.0%	.0%	.0%
Logic Automation		3.5	.0	3.5	0	.4%	.0%	1.1%	.0%	.0%
Genrad		3.5	.7	2.3	35	.4%	.1%	.7%	.1%	.1%
Xilinx		3.2	.0	2.9	0	.3%	.0%	.9%	.0%	.0%
BETRONEX		3.0	.2	2.8	39	.3%	.0%	.8%	.1%	.1%
Data I/O		2.9	.0	2.9	0	.3%	.0%	.9%	.0%	.0%
Research Machines		2.9	2.9	.0	460	.3%	.6%	.0%	1.3%	.1%
ALS Design		2.6	.2	2.4	50	.3%	.0%	.7%	.1%	.1%
Ikos Systems		2.6	2.6	.0	12	.3%	.6%	.0%	.0%	.0%
Silvar-Lisco		2.6	.0	1.4	0	.3%	.0%	.4%	.0%	.0%
ACTEL		2.5	.0	2.3	0	.3%	.0%	.7%	.0%	.0%
debis Systemhaus		2.4	.6	1.4	19	.3%	.1%	.4%	.1%	.1%
Solbourne		2.3	2.2	.0	194	.2%	.5%	.0%	.5%	.5%
Vantage Analysis Systems		2.1	.0	1.8	0	.2%	.0%	.5%	.0%	.0%
CAD-UL		2.1	.0	2.1	0	.2%	.0%	.6%	.0%	.0%
PADS Software		2.1	.0	1.7	0	.2%	.0%	.5%	.0%	.0%
ISDATA		2.0	.0	1.7	0	.2%	.0%	.5%	.0%	.0%

(Continued)

Table 11 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Market Share							
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
CADAM	1.9	.8	.9	120	.2%	.2%	.3%	.3%
Comdisco Systems	1.8	.0	1.6	0	.2%	.0%	.5%	.0%
Microsim	1.7	.0	1.6	0	.2%	.0%	.5%	.0%
X-TRA	1.6	.3	.7	70	.2%	.1%	.2%	.2%
Caditron	1.6	.8	.6	25	.2%	.2%	.2%	.1%
Quickturn Systems	1.4	1.4	.0	8	.1%	.3%	.0%	.0%
DECAD	1.3	.2	.8	5	.1%	.0%	.2%	.0%
Dell Computer	1.3	1.3	.0	327	.1%	.3%	.0%	.9%
Test Systems Strategies	1.2	.0	1.1	0	.1%	.0%	.3%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.1%	.1%	.2%	.3%
Serbi	1.1	.0	1.1	0	.1%	.0%	.3%	.0%
Zuken	1.0	.4	.6	6	.1%	.1%	.2%	.0%
Number One Systems	.9	.1	.8	23	.1%	.0%	.3%	.1%
Compact Software	.9	.0	.6	0	.1%	.0%	.2%	.0%
ISKA	.9	.4	.4	16	.1%	.1%	.1%	.0%
Schlumberger	.9	.2	.3	9	.1%	.0%	.1%	.0%
i-Logix	.8	.0	.8	0	.1%	.0%	.3%	.0%
DAT Standard info systems	.8	.0	.7	0	.1%	.0%	.2%	.0%
Inca	.7	.7	.0	3	.1%	.2%	.0%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.1%	.0%	.2%	.0%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.1%
Technische Computer Systeme	.6	.1	.5	16	.1%	.0%	.1%	.0%
Omaton	.6	.0	.6	0	.1%	.0%	.2%	.0%
National Semiconductor	.6	.1	.5	4	.1%	.0%	.1%	.0%

(Continued)

Table 11 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cascade Design Automation	.6	.0	.4	0	.1%	.0%	.1%	.0%
Everex Systems	.6	.5	.0	166	.1%	.1%	.0%	.5%
ALDEC	.5	.0	.5	0	.1%	.0%	.2%	.0%
Massteck	.4	.0	.4	0	.0%	.0%	.1%	.0%
Pacific Numerics	.4	.0	.4	0	.0%	.0%	.1%	.0%
Accel Technologies	.4	.0	.3	0	.0%	.0%	.1%	.0%
Foresight Resources	.3	.0	.3	0	.0%	.0%	.1%	.0%
Motorola	.3	.0	.3	0	.0%	.0%	.1%	.0%
Seiko Instruments—NO OEM	.3	.1	.1	2	.0%	.0%	.0%	.0%
Kontron Instruments	.2	.1	.1	4	.0%	.0%	.0%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Tanner Research	.2	.0	.2	0	.0%	.0%	.1%	.0%
Ontos	.2	.0	.2	0	.0%	.0%	.1%	.0%
DAPOO	.2	.0	.1	0	.0%	.0%	.0%	.0%
Integrated Silicon Systems	.2	.0	.1	1	.0%	.0%	.0%	.0%
CAD Language Systems	.2	.0	.1	0	.0%	.0%	.0%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.0%
Masta Corporation	.1	.0	.1	1	.0%	.0%	.0%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dolphin Integration	.1	.0	.1	0	.0%	.0%	.0%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 11 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	38.4	33.9	4.2	3,894	4.0%	7.6%	1.3%	10.9%
All Companies	954.4	447.0	327.9	35,887	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	788.8	402.3	224.7	33,410	82.7%	90.0%	68.5%	93.1%
All Asian-Based Companies	1.3	.5	.8	8	.1%	.1%	.2%	.0%
All European-Based Companies	164.3	44.1	102.5	2,469	17.2%	9.9%	31.2%	6.9%
All Hardware Companies	379.4	326.7	.0	31,046	39.8%	73.1%	.0%	86.5%
All Turnkey & SW Companies	575.0	120.3	327.9	4,842	60.2%	26.9%	100.0%	13.5%

Source: Dataquest (February 1992)

Table 12
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	114.0	32.0	47.9	1,107	19.1%	14.4%	20.5%	9.6%
Sun	87.6	76.7	.0	4,444	14.7%	34.5%	.0%	38.7%
Hewlett-Packard	48.3	39.7	.0	3,382	8.1%	17.8%	.0%	29.5%
Intergraph	46.4	8.7	17.5	341	7.8%	3.9%	7.5%	3.0%
Siemens Nixdorf Info systems	38.6	19.0	13.5	527	6.5%	8.5%	5.8%	4.6%
Computervision	37.2	14.6	9.0	352	6.3%	6.6%	3.8%	3.1%
Racal-Redac	35.1	1.5	27.9	162	5.9%	.7%	12.0%	1.4%
Valid	32.0	1.1	20.4	71	5.4%	.5%	8.7%	.6%
Cadence	30.4	.0	22.8	0	5.1%	.0%	9.8%	.0%
Digital	16.4	11.4	.0	613	2.8%	5.1%	.0%	5.3%
HP Cade	15.2	8.9	4.6	66	2.6%	4.0%	1.9%	.6%
Scientific Calc.	13.4	1.1	7.9	49	2.2%	.5%	3.4%	.4%
COMPASS Design Automation-VLSI	12.7	.4	10.5	25	2.1%	.2%	4.5%	.2%
Synopsys	8.4	.0	6.3	0	1.4%	.0%	2.7%	.0%
AnaCAD	4.5	.0	4.5	0	.8%	.0%	1.9%	.0%
EEsof	4.0	.0	3.5	5	.7%	.0%	1.5%	.0%
Sagantec	4.0	.0	3.6	0	.7%	.0%	1.5%	.0%
Analogy	4.0	.0	3.6	0	.7%	.0%	1.5%	.0%
LSI Logic	3.9	.4	3.0	10	.7%	.2%	1.3%	.1%
Logic Automation	3.5	.0	3.5	0	.6%	.0%	1.5%	.0%
Aucotec	3.4	1.2	1.9	39	.6%	.5%	.8%	.3%
Genrad	3.0	.6	2.0	29	.5%	.3%	.9%	.3%

(Continued)

Table 12 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Silvar-Lisco	2.6	.0	1.4	0	.4%	.0%	.6%	.0%
Vantage Analysis Systems	2.1	.0	1.8	0	.4%	.0%	.8%	.0%
Teradyne	2.0	.3	1.3	7	.3%	.1%	.6%	.1%
debis Systemhaus	1.8	.5	1.1	11	.3%	.2%	.5%	.1%
Viewlogic Systems	1.8	.0	1.5	0	.3%	.0%	.6%	.0%
Comdisco Systems	1.8	.0	1.6	0	.3%	.0%	.7%	.0%
Quickturn Systems	1.4	1.4	.0	8	.2%	.6%	.0%	.1%
DECAD	1.3	.2	.8	4	.2%	.1%	.3%	.0%
Test Systems Strategies	1.1	.0	1.0	0	.2%	.0%	.4%	.0%
Autodesk	1.1	.0	1.1	0	.2%	.0%	.5%	.0%
IBM	1.1	.5	.2	31	.2%	.2%	.1%	.3%
Zuken	1.0	.4	.6	6	.2%	.2%	.3%	.1%
ISKA	.9	.4	.4	16	.1%	.2%	.1%	.1%
i-Logix	.8	.0	.8	0	.1%	.0%	.4%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.1%	.0%	.3%	.0%
ICL	.7	.4	.2	19	.1%	.2%	.1%	.2%
Schlumberger	.6	.1	.2	6	.1%	.1%	.1%	.0%
Solbourne	.6	.6	.0	127	.1%	.3%	.0%	1.1%
Data I/O	.6	.0	.6	0	.1%	.0%	.2%	.0%
Cascade Design Automation	.6	.0	.4	0	.1%	.0%	.2%	.0%
National Semiconductor	.5	.1	.4	4	.1%	.0%	.2%	.0%
ACTEL	.5	.0	.5	0	.1%	.0%	.2%	.0%

(Continued)

Table 12 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
ISDATA	.4	.0	.4	0	.1%	.0%	.2%	.0%
Technische Computer Systeme	.4	.1	.3	11	.1%	.0%	.1%	.1%
Pacific Numerics	.4	.0	.4	0	.1%	.0%	.2%	.0%
Compact Software	.4	.0	.4	0	.1%	.0%	.2%	.0%
Xilinx	.3	.0	.3	0	.1%	.0%	.1%	.0%
Motorola	.3	.0	.3	0	.1%	.0%	.1%	.0%
ALS Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Selko Instruments—NO OEM	.3	.1	.1	2	.0%	.0%	.1%	.0%
Inca	.2	.2	.0	1	.0%	.1%	.0%	.0%
Ontos	.2	.0	.2	0	.0%	.0%	.1%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.1%	.0%
Microsim	.2	.0	.2	0	.0%	.0%	.1%	.0%
CAD Language Systems	.2	.0	.1	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.1%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	7	.0%	.0%	.0%	.1%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 12 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	595.5	222.3	233.7	11,484	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	487.1	189.5	173.3	10,619	81.8%	85.2%	74.2%	92.5%
All Asian-Based Companies	1.3	.5	.7	8	.2%	.2%	.3%	.1%
All European-Based Companies	107.1	32.4	59.6	857	18.0%	14.6%	25.5%	7.5%
All Hardware Companies	154.6	130.0	.0	8,582	26.0%	58.5%	.0%	74.7%
All Turnkey & SW Companies	440.9	92.3	233.7	2,902	74.0%	41.5%	100.0%	25.3%

Source: Dataquest (February 1992)

Table 13
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Host-Dependent
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	48.9	35.2	.0	47.4%	49.6%	.0%
IBM	16.3	9.2	3.9	15.8%	13.0%	28.8%
Cadence	4.2	.0	3.1	4.1%	.0%	23.0%
Intergraph	3.3	1.6	.5	3.2%	2.3%	3.8%
Terradyne	1.8	.2	1.1	1.7%	.3%	7.9%
COMPASS Design Automation-TSI	1.1	1.0	1.6	1.0%	1.4%	11.7%
LSI Logic	.4	.1	.3	.4%	.1%	2.4%
Genrad	.3	.1	.2	.3%	.1%	1.7%
debits Systemhaus	.3	.1	.2	.3%	.1%	1.2%
EBsoft	.3	.0	.3	.3%	.0%	1.8%
Computervision	.3	.1	.0	.3%	.1%	.3%
Compact Software	.2	.0	.2	.2%	.0%	1.7%
Analogy	.2	.0	.2	.2%	.0%	1.4%
Schlumberger	.2	.0	.1	.2%	.0%	.4%
ISDATA	.2	.0	.1	.1%	.0%	1.0%
Data I/O	.2	.0	.2	.1%	.0%	1.1%
Test Systems Strategies	.1	.0	.1	.1%	.0%	.9%
CADAM	.1	.0	.1	.1%	.0%	.7%
MacNeal-Schwendler	.1	.0	.1	.1%	.0%	.7%
Logic Automation	.1	.0	.1	.1%	.0%	.5%
DECAD	.0	.0	.0	.0%	.0%	.1%
Selko Instruments—NO CEM	.0	.0	.0	.0%	.0%	.1%
Microsim	.0	.0	.0	.0%	.0%	.1%
Meta-Software	.0	.0	.0	.0%	.0%	.1%

(Continued)

Table 13 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	24.6	23.4	1.2	966	23.9%	33.0%	8.4%	76.9%
All Companies	103.1	71.0	13.6	1,256	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	102.6	70.9	12.2	1,254	99.5%	99.8%	89.5%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.1%	.0%
All European-Based Companies	.5	.1	1.4	2	.5%	.1%	10.4%	.2%
All Hardware Companies	73.5	58.6	.0	966	71.2%	82.5%	.0%	76.9%
All Turnkey & SW Companies	29.7	12.4	13.6	290	28.8%	17.5%	100.0%	23.1%

Source: Dataquest (February 1992)

Table 14

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	23.0	16.6	.0	0	43.0%	42.6%	.0%	.0%
Sun	12.3	10.2	.0	270	22.9%	26.2%	.0%	41.8%
Zycad	4.5	3.6	.0	34	8.4%	9.2%	.0%	5.3%
Hewlett-Packard	3.2	2.7	.0	158	6.0%	6.8%	.0%	24.5%
Ikos Systems	2.6	2.6	.0	12	4.9%	6.7%	.0%	1.9%
Intergraph	2.0	1.0	.5	19	3.7%	2.6%	12.7%	3.0%
Solbourne	1.7	1.6	.0	67	3.1%	4.2%	.0%	10.4%
IBM	.9	.6	.1	84	1.7%	1.6%	3.0%	13.0%
Schlumberger	.1	.0	.0	1	.1%	.1%	.8%	.1%
MacNeal-Schwendler	.1	.0	.1	0	.1%	.0%	1.4%	.0%
Other Companies	3.3	.0	3.0	0	6.2%	.0%	82.0%	.0%
All Companies	53.5	38.9	3.6	645	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	53.5	38.9	3.6	645	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	43.1	34.0	.0	588	80.5%	87.4%	.0%	91.2%
All Turnkey & SW Companies	10.4	4.9	3.6	57	19.5%	12.6%	100.0%	8.8%

Source: Dataquest (February 1992)

Table 15
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue	
Compaq	58.7	58.7	.0	29.0%	51.1%	.0%	44.6%
IBM	17.0	16.1	.0	8.4%	14.0%	.0%	17.6%
Hewlett-Packard	13.5	10.8	.0	6.7%	9.4%	.0%	10.4%
LPKF	12.0	2.4	8.4	5.9%	2.1%	10.9%	2.3%
Autodesk	8.9	.0	8.9	4.4%	.0%	11.6%	.0%
Aucotec	8.0	2.8	4.4	3.9%	2.4%	5.7%	.6%
Ziegler	7.3	.0	7.3	3.6%	.0%	9.4%	.0%
Rascal-Redac	5.2	.0	5.0	2.6%	.0%	6.5%	.0%
Orcad	4.9	.0	4.9	2.4%	.0%	6.4%	.0%
Apple Computer	4.8	4.2	.0	2.4%	3.7%	.0%	4.5%
Kloeden-Moeller	3.7	.9	2.6	1.8%	.8%	3.4%	.6%
Altera	3.7	.0	3.1	1.8%	.0%	4.1%	.0%
BETRONEX	3.0	.2	2.8	1.5%	.2%	3.6%	.2%
Xilinx	2.9	.0	2.6	1.4%	.0%	3.4%	.0%
Research Machines	2.9	2.9	.0	1.4%	2.5%	.0%	2.0%
EEsof	2.7	.0	2.4	1.3%	.0%	3.1%	.0%
ALS Design	2.4	.2	2.2	1.2%	.2%	2.8%	.2%
Viewlogic Systems	2.2	.0	1.9	1.1%	.0%	2.4%	.0%
Data I/O	2.2	.0	2.2	1.1%	.0%	2.9%	.0%
CAD-UL	2.1	.0	2.1	1.0%	.0%	2.7%	.0%
PADS Software	2.1	.0	1.7	1.0%	.0%	2.3%	.0%
ACTEL	2.0	.0	1.8	1.0%	.0%	2.3%	.0%
CADAM	1.8	.8	.8	.9%	.7%	1.1%	.5%
X-TKA	1.6	.3	.7	.8%	.3%	1.0%	.3%

(Continued)

Table 15 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Caditron	1.6	.8	.6	25	.8%	.7%	.8%	.1%
Microsim	1.5	.0	1.4	0	.7%	.0%	1.8%	.0%
ISDATA	1.4	.0	1.2	0	.7%	.0%	1.6%	.0%
Dell Computer	1.3	1.3	.0	327	.6%	1.1%	.0%	1.5%
Aucos elektronische Gerate	1.2	.4	.8	116	.6%	.3%	1.1%	.5%
Serbi	1.1	.0	1.1	0	.5%	.0%	1.4%	.0%
Number One Systems	.9	.1	.8	23	.4%	.1%	1.1%	.1%
DAT Standard Info ssystems	.8	.0	.7	0	.4%	.0%	.9%	.0%
Teradyne	.6	.0	.5	0	.3%	.0%	.6%	.0%
Scientific Calc.	.6	.0	.6	0	.3%	.0%	.8%	.0%
Omaton	.6	.0	.6	0	.3%	.0%	.8%	.0%
ALDEC	.5	.0	.5	0	.2%	.0%	.6%	.0%
Everex Systems	.5	.5	.0	158	.2%	.4%	.0%	.7%
Inca	.5	.5	.0	2	.2%	.4%	.0%	.0%
Massteck	.4	.0	.4	0	.2%	.0%	.6%	.0%
Accel Technologies	.4	.0	.3	0	.2%	.0%	.4%	.0%
Compact Software	.3	.0	.0	0	.2%	.0%	.0%	.0%
Foresight Resources	.3	.0	.3	0	.2%	.0%	.4%	.0%
debis Systemhaus	.3	.1	.2	6	.1%	.1%	.2%	.0%
Kontron Instruments	.2	.1	.1	4	.1%	.1%	.2%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.3%	.0%
Tanner Research	.2	.0	.2	0	.1%	.0%	.2%	.0%
Technische Computer Systeme	.2	.0	.1	5	.1%	.0%	.2%	.0%
Olivetti	.1	.1	.0	17	.0%	.1%	.0%	.1%

(Continued)

Table 15 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Masta Corporation	.1	.0	.1	1	.0%	.0%	.1%	.0%
Genrad	.1	.0	.1	4	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.1%	.0%
Integrated Silicon Systems	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Pacific Numerics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	10.7	10.7	.1	2,928	5.3%	9.3%	.1%	13.0%
All Companies	202.3	114.8	77.0	22,503	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	145.6	103.1	35.5	20,893	72.0%	89.8%	46.2%	92.8%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	56.7	11.7	41.4	1,610	28.0%	10.2%	53.8%	7.2%
All Hardware Companies	108.3	104.1	.0	20,909	53.5%	90.7%	.0%	92.9%
All Turnkey & SW Companies	94.0	10.7	77.0	1,594	46.5%	9.3%	100.0%	7.1%

Source: Dataquest (February 1992)

Table 16
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zuken	97.1	38.9	58.3	567	10.1%	9.0%	13.9%	2.3%
Mentor Graphics	94.6	27.4	39.7	919	9.9%	6.4%	9.5%	3.8%
Cadence	80.1	.0	80.1	0	8.3%	.0%	19.2%	.0%
NEC	78.5	53.0	19.3	4,937	8.2%	12.3%	4.6%	20.4%
Fujitsu	73.2	48.7	17.2	1,636	7.6%	11.3%	4.1%	6.8%
Sun	70.9	61.7	.0	4,786	7.4%	14.3%	.0%	19.8%
Uchida Yoko	36.8	34.9	1.8	584	3.8%	8.1%	.4%	2.4%
Wacom	36.6	7.3	25.5	603	3.8%	1.7%	6.1%	2.5%
Valid	36.0	.0	29.5	0	3.8%	.0%	7.1%	.0%
Sharp System Products—NO OEM	31.2	16.2	15.0	186	3.2%	3.8%	3.6%	.8%
Seiko Instruments—NO OEM	30.6	13.2	14.0	195	3.2%	3.1%	3.3%	.8%
IBM	26.7	19.2	3.8	2,790	2.8%	4.5%	.9%	11.5%
Hewlett-Packard	25.6	21.1	.0	2,313	2.7%	4.9%	.0%	9.6%
CADIX	22.6	9.0	11.3	166	2.4%	2.1%	2.7%	.7%
Digital	21.3	14.3	1.1	138	2.2%	3.3%	.3%	.6%
Racal-Redac	21.0	.8	15.3	85	2.2%	.2%	3.7%	.3%
Intergraph	17.0	3.8	6.4	124	1.8%	.9%	1.5%	.5%
Toshiba—NO OEM	14.9	7.4	6.0	135	1.5%	1.7%	1.4%	.6%
Hitachi	10.5	5.0	4.4	325	1.1%	1.2%	1.1%	1.3%
Synopsys	8.4	.0	6.3	0	.9%	.0%	1.5%	.0%
Scientific Calc.	7.4	1.1	4.3	30	.8%	.2%	1.0%	.1%
Zycad	6.0	4.7	.0	46	.6%	1.1%	.0%	.2%
Sophia Systems	6.0	1.5	3.9	85	.6%	.3%	.9%	.4%
Viewlogic Systems	5.8	.0	4.9	0	.6%	.0%	1.2%	.0%

(Continued)

Table 16 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sony	5.2	4.6	.0	304	.5%	1.1%	.0%	1.3%
Computervision	5.2	2.1	2.5	61	.5%	.5%	.6%	.3%
CADAM	4.8	2.1	2.3	298	.5%	.5%	.6%	1.2%
Tokyo Electron—NO OEM	4.7	1.6	2.3	17	.5%	.4%	.5%	.1%
Silvar-Lisco	4.5	.0	2.5	0	.5%	.0%	.6%	.0%
EEsof	4.1	.0	3.6	3	.4%	.0%	.9%	.0%
Data I/O	3.8	.0	3.8	0	.4%	.0%	.9%	.0%
Compaq	3.6	3.6	.0	615	.4%	.8%	.0%	2.5%
Quickturn Systems	3.5	3.5	.0	19	.4%	.8%	.0%	.1%
Century Research Center	3.3	1.8	1.2	19	.3%	.4%	.3%	.1%
COMPASS Design Automation-VLSI	2.9	.3	2.5	6	.3%	.1%	.6%	.0%
Xilinx	2.7	.0	2.4	0	.3%	.0%	.6%	.0%
Ikos Systems	2.6	2.6	.0	12	.3%	.6%	.0%	.1%
Autodesk	2.5	.0	2.5	0	.3%	.0%	.6%	.0%
Contec Microelectronics	2.4	.0	2.2	0	.3%	.0%	.5%	.0%
PADS Software	2.2	.0	1.9	0	.2%	.0%	.4%	.0%
Apple Computer	2.0	1.8	.0	427	.2%	.4%	.0%	1.8%
ACTEL	1.9	.0	1.8	0	.2%	.0%	.4%	.0%
Sumitomo Denko Workstation	1.8	1.8	.0	100	.2%	.4%	.0%	.4%
LSI Logic	1.8	.2	1.3	4	.2%	.0%	.3%	.0%
Cascade Design Automation	1.7	.0	1.2	0	.2%	.0%	.3%	.0%
Meta-Software	1.6	.0	1.4	0	.2%	.0%	.3%	.0%
Comdisco Systems	1.5	.0	1.3	0	.2%	.0%	.3%	.0%
Logic Automation	1.4	.0	1.4	0	.1%	.0%	.3%	.0%

(Continued)

Table 16 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Teradyne	1.4	.2	.9	3	.1%	.0%	.2%	.0%
Atera	1.4	.0	1.2	0	.1%	.0%	.3%	.0%
Omron	1.4	1.2	.1	39	.1%	.3%	.0%	.2%
Test Systems Strategies	1.2	.0	1.1	0	.1%	.0%	.3%	.0%
Siemens Nixdorf Info systems	1.2	.6	.4	16	.1%	.1%	.1%	.1%
Integrated Silicon Systems	1.1	.2	.9	7	.1%	.0%	.2%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.1%	.0%	.2%	.0%
Analogy	1.1	.0	1.0	0	.1%	.0%	.2%	.0%
Microsim	1.0	.0	1.0	0	.1%	.0%	.2%	.0%
BETRONEX	.9	.1	.8	17	.1%	.0%	.2%	.1%
Compact Software	.9	.0	.6	0	.1%	.0%	.1%	.0%
Quantic Laboratories	.6	.0	.5	0	.1%	.0%	.1%	.0%
i-Logix	.6	.0	.6	0	.1%	.0%	.1%	.0%
LPKF	.5	.3	.1	20	.1%	.1%	.0%	.1%
Scientific & Engineering SW	.4	.0	.4	0	.0%	.0%	.1%	.0%
EPIC Design Technology	.4	.0	.3	0	.0%	.0%	.1%	.0%
Andor	.4	.1	.2	3	.0%	.0%	.1%	.0%
SIMUCAD	.3	.0	.3	0	.0%	.0%	.1%	.0%
Object Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Everex Systems	.1	.1	.0	41	.0%	.0%	.0%	.2%
ALDEC	.1	.0	.1	0	.0%	.0%	.0%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Motorola	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 16 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Kubota Computer	.1	.1	.0	10	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Massteck	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accel Technologies	.1	.0	.0	0	.0%	.0%	.0%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.0%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	12.9	12.4	.1	1,487	1.3%	2.9%	.0%	6.1%
All Companies	959.9	430.4	418.0	24,178	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	481.5	182.4	220.7	14,128	50.2%	42.4%	52.8%	58.4%
All Asian-Based Companies	454.7	246.2	180.5	9,911	47.4%	57.2%	43.2%	41.0%
All European-Based Companies	23.6	1.8	16.7	139	2.5%	.4%	4.0%	.6%
All Hardware Companies	159.2	138.0	.0	12,972	16.6%	32.1%	.0%	53.7%
All Turnkey & SW Companies	800.7	292.3	418.0	11,205	83.4%	67.9%	100.0%	46.3%

Source: Dataquest (February 1992)

Table 17
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zuken	97.1	38.9	58.3	567	13.7%	13.4%	17.3%	4.5%
Mentor Graphics	94.6	27.4	39.7	919	13.3%	9.5%	11.8%	7.3%
Cadence	70.1	.0	70.1	0	9.9%	.0%	20.8%	.0%
Sun	62.2	54.5	.0	4,455	8.8%	18.8%	.0%	35.3%
NEC	47.6	26.7	17.1	2,464	6.7%	9.2%	5.1%	19.5%
Uchida Yokio	36.8	34.9	1.8	584	5.2%	12.1%	.5%	4.6%
Valid	36.0	.0	29.5	0	5.1%	.0%	8.8%	.0%
Fujitsu	30.5	20.3	7.2	717	4.3%	7.0%	2.1%	5.7%
Seiko Instruments—NO OEM	27.3	11.7	12.8	182	3.8%	4.1%	3.8%	1.4%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	3.8%	4.9%	3.9%	1.3%
CADIX	22.6	9.0	11.3	166	3.2%	3.1%	3.4%	1.3%
Racal-Redac	21.0	.8	15.3	85	3.0%	.3%	4.6%	.7%
Hewlett-Packard	18.1	15.1	.0	1,151	2.6%	5.2%	.0%	9.1%
Intergraph	15.9	3.3	6.2	113	2.2%	1.1%	1.8%	.9%
Toshiba—NO OEM	14.9	7.4	6.0	135	2.1%	2.6%	1.8%	1.1%
Synopsys	8.4	.0	6.3	0	1.2%	.0%	1.9%	.0%
Scientific Calc.	6.3	.8	3.4	23	.9%	.3%	1.0%	.2%
Hitachi	5.3	2.5	2.2	109	.7%	.9%	.7%	.9%
Sony	5.2	4.6	.0	304	.7%	1.6%	.0%	2.4%
Computervision	5.2	2.1	2.5	61	.7%	.7%	.7%	.5%
Digital	4.7	2.7	.8	138	.7%	.9%	.2%	1.1%
Tokyo Electron—NO OEM	4.7	1.6	2.3	17	.7%	.5%	.7%	.1%
Silvar-Lisaco	4.5	.0	2.5	0	.6%	.0%	.7%	.0%

(Continued)

Table 17 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Quickturn Systems	3.5	3.5	.0	19	.5%	1.2%	.0%	.1%
Century Research Center	3.3	1.8	1.2	19	.5%	.6%	.4%	.2%
COMPASS Design Automation-VLSI	2.6	.1	2.2	5	.4%	.0%	.6%	.0%
Viewlogic Systems	2.6	.0	2.2	0	.4%	.0%	.6%	.0%
Wacom	2.5	.6	1.9	25	.4%	.2%	.6%	.2%
Contec Microelectronics	2.4	.0	2.2	0	.3%	.0%	.6%	.0%
EEsof	2.4	.0	2.1	3	.3%	.0%	.6%	.0%
Sophia Systems	2.2	.5	1.4	17	.3%	.2%	.4%	.1%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.2%	.6%	.0%	.7%
Cascade Design Automation	1.7	.0	1.2	0	.2%	.0%	.3%	.0%
LSI Logic	1.6	.2	1.2	4	.2%	.1%	.4%	.0%
Comdisco Systems	1.5	.0	1.3	0	.2%	.0%	.4%	.0%
Logic Automation	1.4	.0	1.4	0	.2%	.0%	.4%	.0%
Meta-Software	1.4	.0	1.2	0	.2%	.0%	.4%	.0%
Omron	1.4	1.2	.1	39	.2%	.4%	.0%	.3%
Siemens Nixdorf Info systems	1.2	.6	.4	16	.2%	.2%	.1%	.1%
Test Systems Strategies	1.1	.0	1.0	0	.2%	.0%	.3%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.1%	.0%	.3%	.0%
Analogy	1.0	.0	.9	0	.1%	.0%	.3%	.0%
IBM	1.0	.5	.2	29	.1%	.2%	.1%	.2%
Integrated Silicon Systems	.9	.1	.8	4	.1%	.0%	.2%	.0%
Data I/O	.7	.0	.7	0	.1%	.0%	.2%	.0%
Teradyne	.7	.1	.4	2	.1%	.0%	.1%	.0%

(Continued)

Table 17 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Quantic Laboratories	.6	.0	.5	0	.1%	.0%	.2%	.0%
i-Logix	.6	.0	.6	0	.1%	.0%	.2%	.0%
ACTEL	.4	.0	.4	0	.1%	.0%	.1%	.0%
Compact Software	.4	.0	.4	0	.1%	.0%	.1%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.0%	.0%	.1%	.0%
EPIC Design Technology	.4	.0	.3	0	.0%	.0%	.1%	.0%
Xilinx	.3	.0	.2	0	.0%	.0%	.1%	.0%
Autodesk	.3	.0	.3	0	.0%	.0%	.1%	.0%
SIMUCAD	.2	.0	.2	0	.0%	.0%	.1%	.0%
Object Design	.2	.0	.2	0	.0%	.0%	.1%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.0%	.0%
Motorola	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.1	.0	.1	0	.0%	.0%	.0%	.0%
NGR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	7	.0%	.0%	.0%	.1%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	2	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 17 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	709.4	289.3	336.8	12,638	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	357.2	110.4	184.3	6,927	50.3%	38.2%	54.7%	54.8%
All Asian-Based Companies	330.0	177.5	136.7	5,609	46.5%	61.3%	40.6%	44.4%
All European-Based Companies	22.2	1.4	15.8	102	3.1%	.5%	4.7%	.8%
All Hardware Companies	92.7	80.3	.0	6,068	13.1%	27.8%	.0%	48.0%
All Turnkey & SW Companies	616.7	209.0	336.8	6,569	86.9%	72.2%	100.0%	52.0%

Source: Dataquest (February 1992)

Table 18
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	30.4	20.3	7.1	515	40.0%	42.7%	39.4%	45.4%
IBM	14.5	8.1	3.5	226	19.0%	17.1%	19.2%	19.9%
Digital	11.3	7.9	.2	0	14.8%	16.7%	1.1%	.0%
Seiko Instruments—NO GEM	3.3	1.4	1.1	13	4.3%	3.0%	6.2%	1.2%
Cadence	2.4	.0	2.4	0	3.1%	.0%	13.1%	.0%
Hitachi	1.7	.8	.7	30	2.2%	1.7%	3.9%	2.6%
Scientific Calc.	1.1	.2	.9	6	1.5%	.5%	4.8%	.6%
Intergraph	.7	.3	.1	7	1.0%	.7%	.6%	.6%
Teradyne	.6	.1	.4	0	.7%	.2%	1.9%	.0%
CADAM	.3	.0	.2	0	.4%	.0%	1.3%	.0%
COMPASS Design Automation-VLSI	.2	.2	.3	1	.3%	.4%	1.9%	.1%
Compact Software	.2	.0	.2	0	.3%	.0%	1.3%	.0%
Meta-Software	.2	.0	.2	0	.2%	.0%	.9%	.0%
Data I/O	.2	.0	.2	0	.2%	.0%	1.1%	.0%
LSI Logic	.2	.0	.1	0	.2%	.0%	.7%	.0%
EEsof	.2	.0	.2	0	.2%	.0%	.8%	.0%
Test Systems Strategies	.1	.0	.1	0	.2%	.0%	.7%	.0%
Analogy	.1	.0	.1	0	.1%	.0%	.3%	.0%
Logic Automation	.0	.0	.0	0	.0%	.0%	.2%	.0%
Kubota Computer	.0	.0	.0	3	.0%	.0%	.1%	.3%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Microsim	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 18 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	8.5	8.0	.1	332	11.2%	16.9%	.3%	29.3%
All Companies	76.1	47.5	18.0	1,134	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	40.7	25.0	9.1	573	53.4%	52.5%	50.3%	50.5%
All Asian-Based Companies	35.5	22.6	9.0	561	46.6%	47.5%	49.7%	49.5%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	19.5	16.0	.0	332	25.6%	33.6%	.0%	29.3%
All Turnkey & SW Companies	56.7	31.6	18.0	802	74.4%	66.4%	100.0%	70.7%

Source: Dataquest (February 1992)

Table 19
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	8.7	7.2	.0	330	23.9%	32.8%	.0%	63.1%
Cadence	7.6	.0	7.6	0	20.9%	.0%	78.2%	.0%
Zycad	6.0	4.7	.0	46	16.4%	21.6%	.0%	8.8%
Digital	5.2	3.7	.0	0	14.2%	17.0%	.0%	.0%
Sharp System Products—NO OEM	4.1	2.1	1.9	18	11.1%	9.5%	19.9%	3.4%
Ikos Systems	2.6	2.6	.0	12	7.1%	11.9%	.0%	2.3%
Hewlett-Packard	1.0	.8	.0	49	2.8%	3.8%	.0%	9.4%
IBM	.7	.5	.1	53	1.9%	2.0%	1.0%	10.1%
Intergraph	.4	.2	.1	4	1.2%	.8%	.8%	.8%
Sumitomo Denko Workstation	.1	.1	.0	11	.4%	.6%	.0%	2.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	36.5	22.0	9.8	523	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	32.3	19.8	7.8	495	88.5%	89.8%	80.1%	94.5%
All Asian-Based Companies	4.2	2.2	1.9	29	11.5%	10.2%	19.9%	5.5%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	17.8	14.6	.0	442	48.6%	66.3%	.0%	84.5%
All Turnkey & SW Companies	18.8	7.4	9.8	81	51.4%	33.7%	100.0%	15.5%

Source: Dataquest (February 1992)

Table 20
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	
Wacom	34.2	6.7	23.7	578	24.8%	9.4%	44.3%	5.8%	5.8%
NEC	31.0	26.3	2.2	2,473	22.4%	36.7%	4.1%	25.0%	25.0%
Fujitsu	12.3	8.2	2.9	404	8.9%	11.4%	5.4%	4.1%	4.1%
IBM	10.6	10.1	.0	2,482	7.7%	14.1%	.0%	25.1%	25.1%
Hewlett-Packard	6.4	5.1	.0	1,114	4.7%	7.2%	.0%	11.3%	11.3%
CADAM	4.5	2.1	2.1	298	3.3%	2.9%	3.9%	3.0%	3.0%
Sophia Systems	3.8	.9	2.5	68	2.8%	1.3%	4.6%	.7%	.7%
Compaq	3.6	3.6	.0	615	2.6%	5.0%	.0%	6.2%	6.2%
Hitachi	3.6	1.7	1.5	186	2.6%	2.4%	2.8%	1.9%	1.9%
Viewlogic Systems	3.3	.0	2.7	0	2.4%	.0%	5.1%	.0%	.0%
Data I/O	2.9	.0	2.9	0	2.1%	.0%	5.4%	.0%	.0%
Xilinx	2.4	.0	2.2	0	1.8%	.0%	4.1%	.0%	.0%
Autodesk	2.2	.0	2.2	0	1.6%	.0%	4.1%	.0%	.0%
PADS Software	2.2	.0	1.9	0	1.6%	.0%	3.5%	.0%	.0%
Apple Computer	2.0	1.8	.0	427	1.5%	2.5%	.0%	4.3%	4.3%
EEsof	1.6	.0	1.4	0	1.1%	.0%	2.6%	.0%	.0%
ACTEL	1.6	.0	1.4	0	1.1%	.0%	2.6%	.0%	.0%
Altera	1.4	.0	1.2	0	1.0%	.0%	2.2%	.0%	.0%
BETRONEX	.9	.1	.8	17	.7%	.1%	1.6%	.2%	.2%
Microsim	.9	.0	.9	0	.7%	.0%	1.6%	.0%	.0%
LPKF	.5	.3	.1	20	.4%	.4%	.2%	.2%	.2%
Andor	.4	.1	.2	3	.3%	.1%	.4%	.0%	.0%
Compact Software	.3	.0	.0	0	.2%	.0%	.0%	.0%	.0%
Teradyne	.2	.0	.2	0	.1%	.0%	.3%	.0%	.0%

(Continued)

Table 20 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Personal Computer
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Integrated Silicon Systems	.2	.1	.1	3	.1%	.1%	.2%	.0%
ALDEC	.1	.0	.1	0	.1%	.0%	.2%	.0%
Everex Systems	.1	.1	.0	40	.1%	.2%	.0%	.4%
Digital	.1	.0	.1	0	.1%	.0%	.1%	.0%
Tanner Research	.1	.0	.1	0	.1%	.0%	.1%	.0%
Massteck	.1	.0	.1	0	.0%	.0%	.1%	.0%
Accel Technologies	.1	.0	.0	0	.0%	.0%	.1%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.1%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.1%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	4.4	4.4	.0	1,155	3.2%	6.1%	.0%	11.7%
All Companies	137.9	71.6	53.5	9,882	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	51.4	27.3	19.5	6,133	37.3%	38.1%	36.5%	62.1%
All Asian-Based Companies	85.1	43.9	33.0	3,712	61.7%	61.4%	61.7%	37.6%
All European-Based Companies	1.4	.4	1.0	37	1.0%	.6%	1.8%	.4%
All Hardware Companies	29.3	27.2	.0	6,130	21.2%	38.0%	.0%	62.0%
All Turnkey & SW Companies	108.6	44.4	53.5	3,752	78.8%	62.0%	100.0%	38.0%

Source: Dataquest (February 1992)

Table 21
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation				Market Share												
Platform: All Platforms																
Region: Rest of World																
Units: Millions of U.S. Dollars/Actual Units																
Company	Total		Hardware		Software		Hardware		Total		Hardware		Software		Hardware	
	Factory Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Units Shipped	Revenue	Revenue	Revenue	Revenue	Units Shipped	Revenue	Revenue	Revenue	Units Shipped
Digital	6.6	4.8	.0	46	15.7%	17.3%	.0%	1.7%								
Compaq	6.0	6.0	.0	1,025	14.2%	21.7%	.0%	38.3%								
IBM	3.6	2.9	.3	530	8.4%	10.4%	3.7%	19.8%								
Sun	3.5	3.0	.0	224	8.2%	11.0%	.0%	8.4%								
Intergraph	3.4	1.8	.7	36	8.0%	6.4%	7.0%	1.3%								
Hewlett-Packard	3.1	2.6	.0	276	7.2%	9.3%	.0%	10.3%								
Orcad	1.8	.0	1.8	0	4.4%	.0%	20.0%	.0%								
LSI Logic	.9	.1	.7	2	2.1%	.3%	7.0%	.1%								
Solbourne	.8	.8	.0	70	1.9%	2.9%	.0%	2.6%								
Genrad	.8	.1	.5	8	1.8%	.5%	5.6%	.3%								
Altera	.7	.0	.6	0	1.6%	.0%	6.3%	.0%								
Computervision	.6	.2	.2	7	1.4%	.6%	1.6%	.2%								
Analogy	.5	.0	.5	0	1.3%	.0%	5.1%	.0%								
Zuken	.5	.2	.3	3	1.2%	.8%	3.4%	.1%								
Data I/O	.5	.0	.5	0	1.2%	.0%	5.5%	.0%								
BETRONEX	.5	.1	.4	9	1.1%	.2%	4.4%	.3%								
Siemens Nixdorf Info systems	.4	.2	.1	6	.9%	.7%	1.5%	.2%								
Xilinx	.4	.0	.3	0	.9%	.0%	3.5%	.0%								
Compact Software	.4	.0	.2	0	.9%	.0%	2.5%	.0%								
COMPASS Design Automation-VLSI	.3	.0	.3	1	.8%	.1%	3.0%	.0%								
ACTEL	.3	.0	.3	0	.7%	.0%	3.1%	.0%								
Comdisco Systems	.3	.0	.3	0	.7%	.0%	2.8%	.0%								
PADS Software	.3	.0	.2	0	.6%	.0%	2.3%	.0%								
Autodesk	.2	.0	.2	0	.5%	.0%	2.4%	.0%								
(Continued)																

(Continued)

Table 21 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
EEsof	.2	.0	.2	0	.5%	.0%	2.0%	.0%
Teradyne	.2	.0	.2	0	.5%	.0%	2.0%	.0%
Apple Computer	.2	.2	.0	39	.4%	.6%	.0%	1.4%
Royal Digital Systems	.1	.0	.1	0	.3%	.0%	1.3%	.0%
LPKF	.1	.1	.0	5	.3%	.3%	.3%	.2%
Spectrum Software	.1	.0	.1	0	.2%	.0%	1.1%	.0%
Accel Technologies	.1	.0	.0	0	.1%	.0%	.4%	.0%
Capilano Computing	.1	.0	.1	0	.1%	.0%	.5%	.0%
Massteck	.1	.0	.1	0	.1%	.0%	.5%	.0%
Ziegler	.0	.0	.0	0	.1%	.0%	.3%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.1%	.0%
Other Companies	4.9	4.7	.1	394	11.7%	17.0%	.5%	14.7%
All Companies	42.3	27.5	9.2	2,678	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	40.7	27.0	8.3	2,656	96.4%	98.1%	90.0%	99.2%
All Asian-Based Companies	.5	.2	.3	3	1.2%	.8%	3.4%	.1%
All European-Based Companies	1.0	.3	.6	19	2.4%	1.1%	6.6%	.7%
All Hardware Companies	27.1	24.0	.0	2,580	64.2%	87.3%	.0%	96.3%
All Turnkey & SW Companies	15.1	3.5	9.2	99	35.8%	12.7%	100.0%	3.7%

Source: Dataquest (February 1992)

Table 22
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company	Total				Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	3.0	2.7	.0	214	21.8%	34.0%	.0%	37.8%
Hewlett-Packard	2.5	2.1	.0	212	18.1%	27.0%	.0%	37.3%
Intergraph	2.0	1.1	.4	23	14.6%	14.2%	10.6%	4.1%
Digital	1.2	.9	.0	46	8.9%	11.4%	.0%	8.1%
LSI Logic	.8	.1	.6	2	5.7%	1.0%	16.0%	.4%
Genrad	.7	.1	.5	7	4.8%	1.7%	12.2%	1.1%
Computervision	.6	.2	.2	7	4.2%	2.0%	4.1%	1.2%
Zuken	.5	.2	.3	3	3.7%	2.7%	8.4%	.5%
Analogy	.5	.0	.5	0	3.6%	.0%	12.2%	.0%
Siemens Nixdorf Info systems	.4	.2	.1	6	2.9%	2.4%	3.8%	1.0%
COMPASS Design Automation-VLSI	.3	.0	.2	1	2.2%	.1%	6.5%	.1%
Comdisco Systems	.3	.0	.3	0	2.1%	.0%	7.0%	.0%
Solbourne	.2	.2	.0	46	1.6%	2.8%	.0%	8.0%
Compact Software	.1	.0	.1	0	1.0%	.0%	3.8%	.0%
Royal Digital Systems	.1	.0	.1	0	.9%	.0%	3.3%	.0%
EEsof	.1	.0	.1	0	.9%	.0%	2.7%	.0%
Data I/O	.1	.0	.1	0	.7%	.0%	2.7%	.0%
Teradyne	.1	.0	.1	0	.7%	.0%	2.4%	.0%
IBM	.1	.1	.0	3	.6%	.6%	.5%	.5%
ACTEL	.1	.0	.1	0	.4%	.0%	1.6%	.0%
Xilinx	.0	.0	.0	0	.3%	.0%	.8%	.0%
Autodesk	.0	.0	.0	0	.1%	.0%	.5%	.0%

(Continued)

Table 22 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
Platform: Technical Workstation
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.2%	.0%	.8%	.0%
All Companies	13.9	7.8	3.7	568	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	13.0	7.4	3.2	559	93.4%	94.9%	87.8%	98.5%
All Asian-Based Companies	.5	.2	.3	3	3.7%	2.7%	8.4%	.5%
All European-Based Companies	.4	.2	.1	6	2.9%	2.4%	3.8%	1.0%
All Hardware Companies	7.0	5.9	.0	518	50.3%	75.2%	.0%	91.2%
All Turnkey & SW Companies	6.9	1.9	3.7	50	49.7%	24.8%	100.0%	8.8%

Source: Dataquest (February 1992)

Table 23
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Host-Dependent
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	3.7	2.6	.0	0	35.9%	34.9%	.0%	.0%
IBM	1.3	.7	.3	20	12.5%	9.4%	37.3%	11.0%
Intergraph	.9	.4	.1	8	8.3%	5.4%	16.9%	4.2%
LSI Logic	.1	.0	.1	0	.9%	.1%	7.2%	.1%
Compact Software	.1	.0	.1	0	.9%	.0%	10.8%	.0%
Genrad	.1	.0	.1	0	.8%	.1%	6.0%	.1%
Teradyne	.1	.0	.1	0	.8%	.0%	7.2%	.0%
COMPASS Design Automation-VLSI	.0	.0	.0	0	.3%	.4%	4.8%	.0%
Data I/O	.0	.0	.0	0	.3%	.0%	3.6%	.0%
Analogy	.0	.0	.0	0	.3%	.0%	2.4%	.0%
EEsof	.0	.0	.0	0	.1%	.0%	1.2%	.0%
Other Companies	4.0	3.8	.0	155	38.9%	49.7%	2.4%	84.5%
All Companies	10.2	7.6	.8	184	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	10.2	7.6	.8	184	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	7.6	6.4	.0	155	74.6%	84.5%	.0%	84.5%
All Turnkey & SW Companies	2.6	1.2	.8	29	25.4%	15.5%	100.0%	15.5%

Source: Dataquest (February 1992)

Table 24
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Server
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.7	1.2	.0	0	48.3%	45.9%	.0%	.0%
Solbourne	.6	.6	.0	24	16.8%	22.0%	.0%	39.8%
Intergraph	.5	.2	.1	5	14.0%	9.0%	92.3%	8.6%
Sun	.4	.4	.0	9	12.0%	13.4%	.0%	15.7%
Hewlett-Packard	.2	.2	.0	11	6.4%	7.1%	.0%	18.7%
IBM	.1	.1	.0	10	2.5%	2.6%	7.7%	17.1%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3.6	2.7	.1	60	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.6	2.7	.1	60	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.0	2.4	.0	55	84.9%	90.3%	.0%	91.0%
All Turnkey & SW Companies	.5	.3	.1	5	15.1%	9.7%	100.0%	9.0%

Source: Dataquest (February 1992)

Table 25

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	6.0	6.0	.0	1,025	41.0%	63.3%	.0%	54.9%
IBM	2.1	2.0	.0	496	14.5%	21.4%	.0%	26.6%
Orcad	1.8	.0	1.8	0	12.6%	.0%	40.3%	.0%
Altera	.7	.0	.6	0	4.7%	.0%	12.7%	.0%
BETRONEX	.5	.1	.4	9	3.2%	.5%	9.0%	.5%
Data I/O	.4	.0	.4	0	2.6%	.0%	8.3%	.0%
Xilinx	.3	.0	.3	0	2.2%	.0%	6.3%	.0%
Hewlett-Packard	.3	.3	.0	53	2.1%	2.6%	.0%	2.8%
PADS Software	.3	.0	.2	0	1.7%	.0%	4.6%	.0%
ACTEL	.3	.0	.2	0	1.7%	.0%	5.0%	.0%
Autodesk	.2	.0	.2	0	1.4%	.0%	4.4%	.0%
Apple Computer	.2	.2	.0	39	1.2%	1.7%	.0%	2.1%
Compact Software	.1	.0	.0	0	.9%	.0%	.0%	.0%
LPKF	.1	.1	.0	5	.8%	.7%	.7%	.3%
Spectrum Software	.1	.0	.1	0	.7%	.0%	2.2%	.0%
EEsof	.1	.0	.1	0	.5%	.0%	1.5%	.0%
Massteck	.1	.0	.1	0	.3%	.0%	1.1%	.0%
Accel Technologies	.1	.0	.0	0	.3%	.0%	.9%	.0%
Capilano Computing	.1	.0	.1	0	.3%	.0%	1.1%	.0%
Ziegler	.0	.0	.0	0	.2%	.0%	.7%	.0%
Teradyne	.0	.0	.0	0	.2%	.0%	.7%	.0%
Genrad	.0	.0	.0	1	.1%	.0%	.4%	.1%
American Small Business Comp.	.0	.0	.0	0	.1%	.0%	.2%	.0%

Table 25 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic Design Automation
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.9	.9	.0	239	6.4%	9.6%	.0%	12.8%
All Companies	14.6	9.4	4.6	1,866	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	14.0	9.3	4.1	1,853	95.8%	98.7%	89.7%	99.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.1	.5	14	4.2%	1.3%	10.3%	.7%
All Hardware Companies	9.5	9.3	.0	1,852	65.2%	98.7%	.0%	99.2%
All Turnkey & SW Companies	5.1	.1	4.6	15	34.8%	1.3%	100.0%	.8%

Source: Dataquest (February 1992)

Table 26
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	239.9	69.6	100.7	2,331	13.5%	9.2%	13.8%	3.5%
Sun	167.9	145.8	.0	9,982	9.4%	19.2%	.0%	14.8%
Hewlett-Packard	117.0	96.7	.0	10,580	6.6%	12.7%	.0%	15.7%
Cadence	95.1	.0	74.9	0	5.3%	.0%	10.3%	.0%
Valid	89.8	3.1	64.8	362	5.0%	.4%	8.9%	.5%
Digital	86.4	59.6	2.7	575	4.8%	7.8%	.4%	.9%
Compaq	84.5	84.5	.0	14,451	4.7%	11.1%	.0%	21.4%
Intergraph	79.1	21.7	27.3	616	4.4%	2.9%	3.7%	.9%
NEC	46.2	30.8	11.7	2,873	2.6%	4.1%	1.6%	4.3%
Synopsys	41.9	.0	31.4	0	2.3%	.0%	4.3%	.0%
IBM	36.9	35.0	.0	8,636	2.1%	4.6%	.0%	12.8%
Wacom	36.6	7.3	25.5	603	2.1%	1.0%	3.5%	.9%
Viewlogic Systems	36.5	.0	30.7	0	2.0%	.0%	4.2%	.0%
Racal-Redac	32.3	1.5	26.4	133	1.8%	.2%	3.6%	.2%
Fujitsu	30.6	19.0	8.6	686	1.7%	2.5%	1.2%	1.0%
Zycad	30.0	23.7	.0	230	1.7%	3.1%	.0%	.3%
Siemens Nixdorf Info systems	24.7	12.3	8.7	338	1.4%	1.6%	1.2%	.5%
COMPASS Design Automation-VLSI	21.3	2.2	18.8	44	1.2%	.3%	2.6%	.1%
EEsof	20.5	.1	18.1	15	1.2%	.0%	2.5%	.0%
Zuken	20.1	8.1	12.1	117	1.1%	1.1%	1.7%	.2%
Autodesk	19.5	.0	19.5	0	1.1%	.0%	2.7%	.0%
Computervision	19.4	7.0	4.7	202	1.1%	.9%	.6%	.3%
Xilinx	18.0	.0	16.2	0	1.0%	.0%	2.2%	.0%

(Continued)

Table 26 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
AnaCAD	4.5	.0	4.5	0	.3%	.0%	.6%	.0%
Quad Design Technology	4.3	.0	4.0	0	.2%	.0%	.5%	.0%
Everex Systems	4.3	4.3	.0	1,265	.2%	.6%	.0%	1.9%
Ziegler	4.3	.0	4.3	0	.2%	.0%	.6%	.0%
Contec Microelectronics	4.0	.0	3.6	0	.2%	.0%	.5%	.0%
Solbourne	4.0	4.0	.0	340	.2%	.5%	.0%	.5%
Kloeckner-Moeller	3.7	.9	2.6	130	.2%	.1%	.4%	.2%
Compact Software	3.6	.0	2.9	0	.2%	.0%	.4%	.0%
Scientific & Engineering SW	3.5	.0	3.5	0	.2%	.0%	.5%	.0%
EPIC Design Technology	3.5	.0	3.1	0	.2%	.0%	.4%	.0%
Quantic Laboratories	2.9	.0	2.7	0	.2%	.0%	.4%	.0%
Motorola	2.5	.0	2.5	0	.1%	.0%	.3%	.0%
ALDEC	2.5	.0	2.5	0	.1%	.0%	.3%	.0%
debis Systemhaus	2.4	.6	1.4	19	.1%	.1%	.2%	.0%
Tokyo Electron—NO OEM	2.2	.7	1.1	8	.1%	.1%	.1%	.0%
Sony	2.0	1.8	.0	118	.1%	.2%	.0%	.2%
ISDATA	2.0	.0	1.7	0	.1%	.0%	.2%	.0%
ALS Design	2.0	.2	1.8	37	.1%	.0%	.2%	.1%
Silvar-Lisco	1.9	.0	1.0	0	.1%	.0%	.1%	.0%
Dell Computer	1.9	1.9	.0	488	.1%	.2%	.0%	.7%
Century Research Center	1.9	1.0	.7	11	.1%	.1%	.1%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.1%	.0%	.2%	.0%
SIMUCAD	1.7	.0	1.7	0	.1%	.0%	.2%	.0%

(Continued)

Table 26 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Phase Three Logic	1.7	.0	1.6	0	.1%	.0%	.2%	.0%
Research Machines	1.7	1.7	.0	266	.1%	.2%	.0%	.4%
X-TRA	1.6	.3	.7	70	.1%	.0%	.1%	.1%
Caditron	1.6	.8	.6	25	.1%	.1%	.1%	.0%
Omron	1.4	1.2	.1	39	.1%	.2%	.0%	.1%
Ontos	1.3	.0	1.3	0	.1%	.0%	.2%	.0%
Omaton	1.2	.0	1.2	0	.1%	.0%	.2%	.0%
Cascade Design Automation	1.2	.0	.8	0	.1%	.0%	.1%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.1%	.0%	.1%	.2%
Serbi	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
Spectrum Software	1.1	.0	1.1	0	.1%	.0%	.2%	.0%
National Semiconductor	1.0	.2	.9	8	.1%	.0%	.1%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.1%	.0%	.0%
PADS Software	.9	.0	.7	0	.0%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.0%	.1%	.0%	.0%
Infinite Graphics	.8	.0	.8	0	.0%	.0%	.1%	.0%
DAT Standard info ssytemes	.8	.0	.7	0	.0%	.0%	.1%	.0%
Douglas Electronics	.8	.0	.8	0	.0%	.0%	.1%	.0%
Inca	.7	.7	.0	3	.0%	.1%	.0%	.0%
Visionics	.7	.0	.5	3	.0%	.0%	.1%	.0%
Technische Computer Systeme	.6	.1	.5	17	.0%	.0%	.1%	.0%
CAD Language Systems	.6	.0	.5	0	.0%	.0%	.1%	.0%
Foresight Resources	.6	.0	.5	0	.0%	.0%	.1%	.0%

(Continued)

Table 26 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Capilano Computing	.5	.0	.5	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.1%	.0%
Accel Technologies	.5	.0	.4	0	.0%	.0%	.1%	.0%
PLUS Logic	.4	.0	.4	0	.0%	.0%	.1%	.0%
Tanner Research	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.0%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.0%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.3	.0	.3	0	.0%	.0%	.0%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.0%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.0%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.0%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.0%	.0%
Number One Systems	.1	.0	.1	3	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 26 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	61.7	56.6	4.5	9,077	3.5%	7.5%	.6%	13.5%
All Companies	1,782.7	758.9	730.6	67,388	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1,527.9	657.4	600.2	61,453	85.7%	86.6%	82.2%	91.2%
All Asian-Based Companies	146.3	71.2	63.2	4,532	8.2%	9.4%	8.7%	6.7%
All European-Based Companies	108.5	30.3	67.2	1,402	6.1%	4.0%	9.2%	2.1%
All Hardware Companies	596.9	526.7	.0	57,594	33.5%	69.4%	.0%	85.5%
All Turnkey & SW Companies	1,185.8	232.2	730.6	9,794	66.5%	30.6%	100.0%	14.5%

Source: Dataquest (February 1992)

Table 27
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Technical Workstation
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	239.9	69.6	100.7	2,331	21.0%	18.2%	19.0%	10.6%
Sun	142.7	125.0	.0	9,347	12.5%	32.7%	.0%	42.5%
Valid	89.8	3.1	64.8	362	7.9%	.8%	12.2%	1.6%
Cadence	86.8	.0	68.2	0	7.6%	.0%	12.8%	.0%
Hewlett-Packard	83.7	69.9	.0	5,417	7.3%	18.3%	.0%	24.6%
Intergraph	66.8	15.5	25.1	498	5.9%	4.1%	4.7%	2.3%
Synopsys	41.9	.0	31.4	0	3.7%	.0%	5.9%	.0%
NEC	29.1	16.3	10.5	1,507	2.6%	4.3%	2.0%	6.8%
Racal-Redac	28.1	1.5	22.4	133	2.5%	.4%	4.2%	.6%
Siemens Nixdorf Info systems	24.7	12.3	8.7	338	2.2%	3.2%	1.6%	1.5%
Zuken	20.1	8.1	12.1	117	1.8%	2.1%	2.3%	.5%
COMPASS Design Automation-VLSI	19.6	.6	16.3	39	1.7%	.2%	3.1%	.2%
Computervision	19.0	6.8	4.7	193	1.7%	1.8%	.9%	.9%
Digital	18.0	11.1	2.0	575	1.6%	2.9%	.4%	2.6%
Viewlogic Systems	16.2	.0	13.6	0	1.4%	.0%	2.6%	.0%
LSI Logic	14.0	1.4	10.5	36	1.2%	.4%	2.0%	.2%
Quickturn Systems	14.0	14.0	.0	75	1.2%	3.7%	.0%	.3%
Logic Automation	13.9	.0	13.9	0	1.2%	.0%	2.6%	.0%
Fujitsu	12.8	7.9	3.6	301	1.1%	2.1%	.7%	1.4%
EEsof	11.9	.1	10.3	15	1.0%	.0%	1.9%	.1%
HP Cade	10.7	6.4	3.2	46	.9%	1.7%	.6%	.2%
Analogy	10.0	.0	9.0	0	.9%	.0%	1.7%	.0%
Comdisco Systems	9.8	.0	8.8	0	.9%	.0%	1.7%	.0%
Ascent Logic Corp.	7.5	.0	6.0	0	.7%	.0%	1.1%	.0%

(Continued)

Table 27 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE	Millions of U.S. Dollars/Actual Units										
Platform: Technical Workstation	Company	Total		Hardware		Software		Hardware		Market Share	
Region: Worldwide		Factory	Revenue	Revenue	Units Shipped	Revenue	Revenue	Revenue	Revenue	Units Shipped	
Units:	Teradyne	7.3	1.1	4.7	26	.6%	.3%	.9%	.1%		
	Vantage Analysis Systems	7.0	.0	6.0	0	.6%	.0%	1.1%	.0%		
	Genrad	6.7	1.3	4.5	65	.6%	.3%	.8%	.3%		
	Meta-Software	6.0	.0	5.2	0	.5%	.0%	1.0%	.0%		
	Test Systems Strategies	5.6	.0	4.8	0	.5%	.0%	.9%	.0%		
	i-Logix	5.5	.0	5.5	0	.5%	.0%	1.0%	.0%		
	AnaCAD	4.5	.0	4.5	0	.4%	.0%	.9%	.0%		
	Quad Design Technology	4.3	.0	4.0	0	.4%	.0%	.7%	.0%		
	Contec Microelectronics	4.0	.0	3.6	0	.4%	.0%	.7%	.0%		
	Scientific Calc.	3.5	.4	2.0	13	.3%	.1%	.4%	.1%		
	Scientific & Engineering SW	3.5	.0	3.5	0	.3%	.0%	.7%	.0%		
	EPIC Design Technology	3.5	.0	3.1	0	.3%	.0%	.6%	.0%		
	Aucotec	3.4	1.2	1.9	39	.3%	.3%	.4%	.2%		
	Quantic Laboratories	2.9	.0	2.7	0	.3%	.0%	.5%	.0%		
	Motorola	2.5	.0	2.5	0	.2%	.0%	.5%	.0%		
	ACTEL	2.5	.0	2.3	0	.2%	.0%	.4%	.0%		
	Wacom	2.5	.6	1.9	25	.2%	.2%	.4%	.1%		
	Data I/O	2.4	.0	2.4	0	.2%	.0%	.5%	.0%		
	Tokyo Electron—NO OEM	2.2	.7	1.1	8	.2%	.2%	.2%	.0%		
	Autodesk	2.2	.0	2.2	0	.2%	.0%	.4%	.0%		
	Sony	2.0	1.8	.0	118	.2%	.5%	.0%	.5%		
	Silvar-Lisco	1.9	.0	1.0	0	.2%	.0%	.2%	.0%		
	Century Research Center	1.9	1.0	.7	11	.2%	.3%	.1%	.0%		
	debis Systemhaus	1.8	.5	1.1	11	.2%	.1%	.2%	.1%		
										(Continued)	

(Continued)

Table 27 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Technical Workstation
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Xilinx	1.8	.0	1.6	0	.2%	.0%	.3%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.2%	.0%	.3%	.0%
Sophia Systems	1.6	.4	1.1	13	.1%	.1%	.2%	.1%
Compact Software	1.4	.0	1.4	0	.1%	.0%	.3%	.0%
Omron	1.4	1.2	.1	39	.1%	.3%	.0%	.2%
SIMUCAD	1.3	.0	1.3	0	.1%	.0%	.2%	.0%
Ontos	1.3	.0	1.3	0	.1%	.0%	.2%	.0%
Cascade Design Automation	1.2	.0	.8	0	.1%	.0%	.2%	.0%
Solbourne	1.1	1.1	.0	221	.1%	.3%	.0%	1.0%
National Semiconductor	.9	.2	.8	8	.1%	.0%	.1%	.0%
ISKA	.9	.4	.4	16	.1%	.1%	.1%	.1%
Microsim	.9	.0	.8	0	.1%	.0%	.2%	.0%
CAD Language Systems	.6	.0	.5	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.5	.0	.4	0	.0%	.0%	.1%	.0%
Everex Systems	.5	.5	.0	55	.0%	.1%	.0%	.2%
Phase Three Logic	.5	.0	.4	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.5	.1	.4	12	.0%	.0%	.1%	.1%
ISDATA	.4	.0	.4	0	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.1%	.0%
Inca	.2	.2	.0	1	.0%	.1%	.0%	.0%
ALS Design	.2	.0	.2	0	.0%	.0%	.0%	.0%
Infinite Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.0%	.0%

(Continued)

Table 27 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Technical Workstation
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	1,140.2	381.9	531.2	22,007	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	991.0	321.3	457.1	19,272	86.9%	84.1%	86.0%	87.6%
All Asian-Based Companies	73.6	38.0	30.9	2,139	6.5%	9.9%	5.8%	9.7%
All European-Based Companies	75.6	22.6	43.2	596	6.6%	5.9%	8.1%	2.7%
All Hardware Companies	259.5	223.5	.0	15,808	22.8%	58.5%	.0%	71.8%
All Turnkey & SW Companies	880.6	158.4	531.2	6,199	77.2%	41.5%	100.0%	28.2%

Source: Dataquest (February 1992)

Table 28
1991 Preliminary CAD/CAM/CAR Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	46.5	33.0	.5	0	38.7%	43.8%	1.9%	.0%
Fujitsu	12.7	7.9	3.6	214	10.6%	10.4%	14.0%	14.9%
Intergraph	8.7	4.4	1.4	81	7.2%	5.8%	5.4%	5.6%
Cadence	6.9	.0	5.3	0	5.7%	.0%	20.7%	.0%
Teradyne	6.3	.9	3.9	4	5.3%	1.2%	15.4%	.3%
COMPASS Design Automation-VLSI	1.7	1.6	2.5	6	1.4%	2.1%	9.8%	.4%
LSI Logic	1.6	.2	1.2	3	1.3%	.2%	4.6%	.2%
Compact Software	.9	.0	.9	0	.8%	.0%	3.6%	.0%
Meta-Software	.8	.0	.7	0	.7%	.0%	2.8%	.0%
EEsof	.8	.0	.7	0	.7%	.0%	2.9%	.0%
Genrad	.8	.2	.5	2	.6%	.2%	2.0%	.2%
Scientific Calc.	.7	.2	.6	4	.6%	.2%	2.2%	.3%
Data I/O	.7	.0	.7	0	.5%	.0%	2.6%	.0%
Test Systems Strategies	.6	.0	.6	0	.5%	.0%	2.4%	.0%
Analogy	.5	.0	.5	0	.4%	.0%	1.9%	.0%
Computervision	.4	.1	.1	10	.3%	.1%	.3%	.7%
debis Systemhaus	.3	.1	.2	2	.2%	.1%	.7%	.1%
Logic Automation	.3	.0	.3	0	.2%	.0%	1.1%	.0%
ISDATA	.2	.0	.1	0	.1%	.0%	.6%	.0%
Microsim	.1	.0	.1	0	.1%	.0%	.3%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.1%	.0%	.4%	.0%
SIMUCAD	.1	.0	.1	0	.1%	.0%	.3%	.0%

(Continued)

Table 28 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	28.4	27.0	1.1	1,117	23.7%	35.9%	4.3%	77.4%
All Companies	119.9	75.5	25.4	1,443	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	106.8	67.4	20.5	1,227	89.1%	89.5%	80.5%	85.0%
All Asian-Based Companies	12.7	7.9	3.6	214	10.6%	10.4%	14.0%	14.9%
All European-Based Companies	.4	.1	1.4	2	.4%	.1%	5.5%	.1%
All Hardware Companies	74.2	60.0	.0	1,117	61.9%	79.7%	.0%	77.4%
All Turnkey & SW Companies	45.7	15.3	25.4	326	38.1%	20.3%	100.0%	22.6%

Source: Dataquest (February 1992)

Table 29
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zycad	30.0	23.7	.0	230	28.1%	28.7%	.0%	15.4%
Sun	25.2	20.8	.0	635	23.6%	25.2%	.0%	42.6%
Digital	21.6	15.5	.0	0	20.2%	18.8%	.0%	.0%
Ikos Systems	13.1	13.1	.0	61	12.2%	15.8%	.0%	4.1%
Hewlett-Packard	4.8	4.0	.0	236	4.5%	4.8%	.0%	15.8%
Intergraph	3.6	1.8	.9	37	3.4%	2.2%	15.9%	2.5%
Solbourne	2.9	2.9	.0	119	2.8%	3.5%	.0%	8.0%
Cadence	1.4	.0	1.4	0	1.3%	.0%	26.2%	.0%
IBM	.8	.7	.0	173	.7%	.9%	.0%	11.6%
SIMUCAD	.1	.0	.1	0	.1%	.0%	1.5%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.9%	.0%
Other Companies	3.3	.0	3.0	0	3.1%	.0%	55.5%	.0%
All Companies	106.8	82.5	5.4	1,490	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	106.8	82.5	5.4	1,490	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	68.3	57.0	.0	1,224	64.0%	69.1%	.0%	82.1%
All Turnkey & SW Companies	38.5	25.5	5.4	267	36.0%	30.9%	100.0%	17.9%

Source: Dataquest (February 1992)

Table 30
1991 Preliminary CAD/CAM/CAE Market Share

Company	Application: Platform: Region: Units:	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Market Share			
						Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	Electronic CAE	84.5	84.5	.0	14,451	20.3%	38.5%	.0%	34.0%
IBM	Personal Computer	36.1	34.3	.0	8,464	8.7%	15.7%	.0%	19.9%
Wacom	Worldwide	34.2	6.7	23.7	578	8.2%	3.1%	14.0%	1.4%
Hewlett-Packard		28.5	22.8	.0	4,928	6.9%	10.4%	.0%	11.6%
Viewlogic Systems		20.3	.0	17.1	0	4.9%	.0%	10.1%	.0%
Autodesk		17.4	.0	17.4	0	4.2%	.0%	10.3%	.0%
NEC		17.1	14.5	1.2	1,366	4.1%	6.6%	.7%	3.2%
Xilinx		16.2	.0	14.6	0	3.9%	.0%	8.6%	.0%
Altera		13.7	.0	11.6	0	3.3%	.0%	6.9%	.0%
ACTEL		10.0	.0	9.0	0	2.4%	.0%	5.3%	.0%
Data I/O		9.6	.0	9.6	0	2.3%	.0%	5.7%	.0%
Apple Computer		9.3	8.2	.0	1,940	2.2%	3.7%	.0%	4.6%
Aucotec		8.0	2.8	4.4	142	1.9%	1.3%	2.6%	.3%
EEsof		7.8	.0	7.0	0	1.9%	.0%	4.2%	.0%
Microsim		7.6	.0	7.1	0	1.8%	.0%	4.2%	.0%
Orcad		7.4	.0	7.4	0	1.8%	.0%	4.4%	.0%
Fujitsu		5.2	3.2	1.5	170	1.2%	1.5%	.9%	.4%
Ziegler		4.3	.0	4.3	0	1.0%	.0%	2.5%	.0%
Racal-Redac		4.2	.0	4.0	0	1.0%	.0%	2.4%	.0%
Everex Systems		3.8	3.8	.0	1,210	.9%	1.7%	.0%	2.9%
Kloeckner-Moeller		3.7	.9	2.6	130	.9%	.4%	1.6%	.3%
Sophia Systems		3.7	.9	2.4	65	.9%	.4%	1.4%	.2%
ALDEC		2.5	.0	2.5	0	.6%	.0%	1.5%	.0%

(Continued)

Table 30 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Teradyne	2.2	.0	1.7	0	.5%	.0%	1.0%	.0%
Dell Computer	1.9	1.9	.0	488	.5%	.9%	.0%	1.2%
ALS Design	1.8	.2	1.6	37	.4%	.1%	.9%	.1%
Research Machines	1.7	1.7	.0	266	.4%	.8%	.0%	.6%
X-TRA	1.6	.3	.7	70	.4%	.2%	.4%	.2%
Caditron	1.6	.8	.6	25	.4%	.4%	.4%	.1%
ISDATA	1.4	.0	1.2	0	.3%	.0%	.7%	.0%
Compact Software	1.3	.0	.5	0	.3%	.0%	.3%	.0%
Phase Three Logic	1.3	.0	1.1	0	.3%	.0%	.7%	.0%
Omaton	1.2	.0	1.2	0	.3%	.0%	.7%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.3%	.2%	.5%	.3%
Spectrum Software	1.1	.0	1.1	0	.3%	.0%	.7%	.0%
Serbi	1.1	.0	1.1	0	.3%	.0%	.6%	.0%
Intrinsix	1.0	1.0	.0	10	.2%	.5%	.0%	.0%
PADS Software	.9	.0	.7	0	.2%	.0%	.4%	.0%
DAT Standard info ssystemes	.8	.0	.7	0	.2%	.0%	.4%	.0%
Douglas Electronics	.8	.0	.8	0	.2%	.0%	.4%	.0%
Visionics	.7	.0	.5	3	.2%	.0%	.3%	.0%
Infinite Graphics	.7	.0	.7	0	.2%	.0%	.4%	.0%
Scientific Calc.	.6	.0	.6	0	.1%	.0%	.4%	.0%
Foresight Resources	.6	.0	.5	0	.1%	.0%	.3%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.3%	.0%
Inca	.5	.5	.0	2	.1%	.2%	.0%	.0%

(Continued)

Table 30 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Accel Technologies	.5	.0	.4	0	.1%	.0%	.3%	.0%
PLUS Logic	.4	.0	.4	0	.1%	.0%	.3%	.0%
Tanner Research	.4	.0	.4	0	.1%	.0%	.2%	.0%
The CAD Group	.4	.0	.4	0	.1%	.0%	.2%	.0%
BV Engineering	.4	.0	.4	0	.1%	.0%	.2%	.0%
Digital	.3	.0	.2	0	.1%	.0%	.1%	.0%
debis Systemhaus	.3	.1	.2	6	.1%	.0%	.1%	.0%
American Small Business Comp.	.3	.0	.3	0	.1%	.0%	.2%	.0%
SIMUCAD	.3	.0	.3	0	.1%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.1%	.0%
Genrad	.2	.0	.2	10	.1%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.2	.0	.2	5	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.1%	.0%
Number One Systems	.1	.0	.1	3	.0%	.0%	.1%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 30 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	30.2	29.8	.4	7,961	7.3%	13.6%	.2%	18.8%
All Companies	415.8	219.2	168.6	42,448	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	323.4	186.3	117.3	39,464	77.8%	85.0%	69.6%	93.0%
All Asian-Based Companies	60.1	25.4	28.7	2,179	14.4%	11.6%	17.0%	5.1%
All European-Based Companies	32.4	7.6	22.6	804	7.8%	3.5%	13.4%	1.9%
All Hardware Companies	194.8	186.2	.0	39,446	46.8%	84.9%	.0%	92.9%
All Turnkey & SW Companies	221.0	33.0	168.6	3,002	53.2%	15.1%	100.0%	7.1%

Source: Dataquest (February 1992)

Table 31
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware		
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Factory Revenue	Software Revenue	Hardware Revenue	Software Revenue	Units Shipped
Mentor Graphics	113.5	32.9	47.7	10.4%	13.9%	13.3%	10.4%	13.3%	3.9%
Sun	87.5	76.0	.0	24.0%	10.7%	.0%	24.0%	.0%	19.8%
Cadence	66.5	.0	49.9	.0%	8.1%	13.9%	.0%	13.9%	.0%
Valid	48.5	2.4	34.5	.8%	5.9%	9.6%	.8%	9.6%	1.1%
Hewlett-Packard	43.7	36.1	.0	11.4%	5.3%	.0%	11.4%	.0%	14.1%
Digital	42.6	28.6	2.2	9.0%	5.2%	.6%	9.0%	.6%	1.0%
Intergraph	37.1	11.3	12.1	3.6%	4.5%	3.4%	3.6%	3.4%	1.1%
Compaq	36.3	36.3	.0	11.5%	4.4%	.0%	11.5%	.0%	22.2%
Viewlogic Systems	26.7	.0	22.4	.0%	3.3%	6.3%	.0%	6.3%	.0%
Synopsys	25.1	.0	18.8	.0%	3.1%	5.3%	.0%	5.3%	.0%
Zycad	19.5	15.4	.0	4.9%	2.4%	.0%	4.9%	.0%	.5%
Racal-Redac	17.0	.8	13.9	.3%	2.1%	3.9%	.3%	3.9%	.3%
Xilinx	11.7	.0	10.5	.0%	1.4%	2.9%	.0%	2.9%	.0%
IBM	11.1	10.5	.0	3.3%	1.4%	.0%	3.3%	.0%	9.2%
COMPASS Design Automation-VLSI	10.0	1.0	8.8	.3%	1.2%	2.5%	.3%	2.5%	.1%
Teradyne	9.9	1.2	6.4	.4%	1.2%	1.8%	.4%	1.8%	.1%
LSI Logic	9.3	.9	7.0	.3%	1.1%	2.0%	.3%	2.0%	.1%
EEsof	9.2	.1	8.1	.0%	1.1%	2.3%	.0%	2.3%	.0%
Logic Automation	9.2	.0	9.2	.0%	1.1%	2.6%	.0%	2.6%	.0%
Quickturn Systems	9.1	9.1	.0	2.9%	1.1%	.0%	2.9%	.0%	.2%
Altera	7.9	.0	6.7	.0%	1.0%	1.9%	.0%	1.9%	.0%
Ikos Systems	7.8	7.8	.0	2.5%	1.0%	.0%	2.5%	.0%	.1%
ACTEL	7.8	.0	7.0	.0%	.9%	2.0%	.0%	2.0%	.0%
Ascent Logic Corp.	7.5	.0	6.0	.0%	.9%	1.7%	.0%	1.7%	.0%

(Continued)

Table 31 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE		Millions of U.S. Dollars/Actual Units									
Platform: All Platforms	Region: North America										
Units:											
Company	Total		Market Share				Market Share				
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Hardware Revenue	Hardware Units Shipped	
Autodesk	7.2	.0	7.2	0	.9%	.0%	2.0%	.0%	.0%	.0%	
Computervision	6.7	1.8	1.7	76	.8%	.6%	.5%	.3%	.6%	.3%	
Comdisco Systems	6.3	.0	5.6	0	.8%	.0%	1.6%	.0%	.0%	.0%	
Microsim	5.8	.0	5.4	0	.7%	.0%	1.5%	.0%	.0%	.0%	
Apple Computer	5.7	5.1	.0	1,203	.7%	1.6%	.0%	4.3%	.0%	.0%	
Data I/O	5.4	.0	5.4	0	.7%	.0%	1.5%	.0%	.0%	.0%	
Meta-Software	5.1	.0	4.5	0	.6%	.0%	1.2%	.0%	.0%	.0%	
Analogy	4.7	.0	4.3	0	.6%	.0%	1.2%	.0%	.0%	.0%	
Quad Design Technology	4.3	.0	4.0	0	.5%	.0%	1.1%	.0%	.0%	.0%	
i-Logix	4.1	.0	4.1	0	.5%	.0%	1.2%	.0%	.0%	.0%	
Vantage Analysis Systems	3.9	.0	3.3	0	.5%	.0%	.9%	.0%	.0%	.0%	
Everex Systems	3.8	3.9	.0	1,139	.5%	1.2%	.0%	4.1%	.0%	.0%	
Test Systems Strategies	3.7	.0	3.2	0	.5%	.0%	.9%	.0%	.0%	.0%	
Genrad	3.5	.7	2.3	35	.4%	.2%	.6%	.1%	.2%	.1%	
Solbourne	3.3	3.3	.0	276	.4%	1.0%	.0%	1.0%	.0%	.0%	
EPIC Design Technology	3.1	.0	2.8	0	.4%	.0%	.8%	.0%	.0%	.0%	
Orcad	2.6	.0	2.6	0	.3%	.0%	.7%	.0%	.0%	.0%	
Scientific & Engineering SW	2.5	.0	2.5	0	.3%	.0%	.7%	.0%	.0%	.0%	
Scientific Calc.	2.4	.4	1.5	10	.3%	.1%	.4%	.0%	.1%	.0%	
Quantic Laboratories	2.3	.0	2.1	0	.3%	.0%	.6%	.0%	.0%	.0%	
Motorola	2.1	.0	2.1	0	.3%	.0%	.6%	.0%	.0%	.0%	
ALDEC	1.9	.0	1.9	0	.2%	.0%	.5%	.0%	.0%	.0%	
CAD/CAM Group	1.8	.0	1.8	0	.2%	.0%	.5%	.0%	.0%	.0%	
Phase Three Logic	1.7	.0	1.6	0	.2%	.0%	.4%	.0%	.0%	.0%	

(Continued)

(Continued)

Table 31 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Contec Microelectronics	1.6	.0	1.4	0	.2%	.0%	.4%	.0%
SIMUCAD	1.5	.0	1.4	0	.2%	.0%	.4%	.0%
Compact Software	1.4	.0	1.4	0	.2%	.0%	.4%	.0%
Dell Computer	1.2	1.2	.0	322	.2%	.4%	.0%	1.1%
Ontos	1.2	.0	1.2	0	.1%	.0%	.3%	.0%
Zuken	1.0	.4	.6	6	.1%	.1%	.2%	.0%
Spectrum Software	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Intrinsix	1.0	1.0	.0	10	.1%	.3%	.0%	.0%
Infinite Graphics	.8	.0	.8	0	.1%	.0%	.2%	.0%
Oration	.8	.0	.8	0	.1%	.0%	.2%	.0%
Douglas Electronics	.8	.0	.8	0	.1%	.0%	.2%	.0%
Cascade Design Automation	.7	.0	.5	0	.1%	.0%	.1%	.0%
Visionics	.7	.0	.5	3	.1%	.0%	.1%	.0%
National Semiconductor	.5	.1	.4	4	.1%	.0%	.1%	.0%
Silvar-Lisco	.5	.0	.3	0	.1%	.0%	.1%	.0%
Capilano Computing	.5	.0	.5	0	.1%	.0%	.1%	.0%
PLUS Logic	.4	.0	.4	0	.1%	.0%	.1%	.0%
PADS Software	.4	.0	.4	0	.1%	.0%	.1%	.0%
NCR Microelectronics	.4	.0	.4	0	.1%	.0%	.1%	.0%
Accel Technologies	.4	.0	.4	0	.0%	.0%	.1%	.0%
The CAD Group	.4	.0	.4	0	.0%	.0%	.1%	.0%
BV Engineering	.4	.0	.4	0	.0%	.0%	.1%	.0%
CAD Language Systems	.3	.0	.3	0	.0%	.0%	.1%	.0%
Tanner Research	.3	.0	.3	0	.0%	.0%	.1%	.0%

(Continued)

Table 31 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Foresight Resources	.3	.0	.2	0	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.2	.0	.2	0	.0%	.0%	.1%	.0%
Bobcat Systems	.2	.0	.2	0	.0%	.0%	.1%	.0%
Simutest	.2	.0	.2	0	.0%	.0%	.1%	.0%
Cascade Graphics	.2	.0	.2	0	.0%	.0%	.0%	.0%
Vamp	.2	.0	.2	0	.0%	.0%	.0%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	29.8	28.7	.3	4,254	3.6%	9.1%	.1%	15.2%
All Companies	818.3	316.9	357.6	28,025	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	800.3	315.7	343.1	27,948	97.8%	99.6%	96.0%	99.7%
All Asian-Based Companies	1.0	.4	.6	6	.1%	.1%	.2%	.0%
All European-Based Companies	17.0	.8	13.9	72	2.1%	.3%	3.9%	.3%
All Hardware Companies	278.7	246.5	.0	25,867	34.1%	77.8%	.0%	92.3%
All Turnkey & SW Companies	539.6	70.4	357.6	2,159	65.9%	22.2%	100.0%	7.7%

Source: Dataquest (February 1992)

Table 32
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Shipped	Units Shipped
Mentor Graphics	113.5	32.9	47.7	1,103	20.9%	21.1%	17.4%	11.1%	11.1%
Sun	74.4	65.1	.0	5,269	13.7%	41.7%	.0%	53.2%	53.2%
Cadence	61.2	.0	45.9	0	11.3%	.0%	16.8%	.0%	.0%
Valid	48.5	2.4	34.5	320	8.9%	1.6%	12.6%	3.2%	3.2%
Hewlett-Packard	31.9	26.6	.0	2,171	5.9%	17.1%	.0%	21.9%	21.9%
Intergraph	29.7	7.6	10.8	232	5.5%	4.9%	3.9%	2.3%	2.3%
Synopsys	25.1	.0	18.8	0	4.6%	.0%	6.9%	.0%	.0%
Racal-Redac	14.8	.8	11.8	71	2.7%	.5%	4.3%	.7%	.7%
Viewlogic Systems	11.8	.0	9.9	0	2.2%	.0%	3.6%	.0%	.0%
Digital	9.5	5.3	1.6	276	1.7%	3.4%	.6%	2.8%	2.8%
COMPASS Design Automation-VLSI	9.2	.3	7.6	18	1.7%	.2%	2.8%	.2%	.2%
Quickturn Systems	9.1	9.1	.0	49	1.7%	5.8%	.0%	.5%	.5%
Logic Automation	9.0	.0	9.0	0	1.7%	.0%	3.3%	.0%	.0%
LSI Logic	8.4	.8	6.3	21	1.5%	.5%	2.3%	.2%	.2%
Ascent Logic Corp.	7.5	.0	6.0	0	1.4%	.0%	2.2%	.0%	.0%
Computervision	6.6	1.8	1.7	75	1.2%	1.1%	.6%	.8%	.8%
Condisco Systems	6.3	.0	5.6	0	1.2%	.0%	2.1%	.0%	.0%
ERSof	5.4	.1	4.7	7	1.0%	.0%	1.7%	.1%	.1%
Teradyne	4.5	.7	2.9	16	.8%	.4%	1.1%	.2%	.2%
Analogy	4.5	.0	4.1	0	.8%	.0%	1.5%	.0%	.0%
Meta-Software	4.5	.0	3.9	0	.8%	.0%	1.4%	.0%	.0%
Quad Design Technology	4.3	.0	4.0	0	.8%	.0%	1.4%	.0%	.0%
I-Logix	4.1	.0	4.1	0	.8%	.0%	1.5%	.0%	.0%
Vantage Analysis Systems	3.9	.0	3.3	0	.7%	.0%	1.2%	.0%	.0%

(Continued)

Table 32 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Test Systems Strategies	3.4	.0	2.9	0	.6%	.0%	1.0%	.0%
EPIC Design Technology	3.1	.0	2.8	0	.6%	.0%	1.0%	.0%
Genrad	3.0	.6	2.0	29	.6%	.4%	.7%	.3%
Scientific & Engineering SW	2.5	.0	2.5	0	.5%	.0%	.9%	.0%
Quantic Laboratories	2.3	.0	2.1	0	.4%	.0%	.8%	.0%
Motorola	2.1	.0	2.1	0	.4%	.0%	.8%	.0%
CAD/CAM Group	1.8	.0	1.8	0	.3%	.0%	.7%	.0%
Scientific Calc.	1.7	.2	.9	6	.3%	.1%	.3%	.1%
Contec Microelectronics	1.6	.0	1.4	0	.3%	.0%	.5%	.0%
ACTEL	1.6	.0	1.4	0	.3%	.0%	.5%	.0%
Ortos	1.2	.0	1.2	0	.2%	.0%	.4%	.0%
Xilinx	1.2	.0	1.1	0	.2%	.0%	.4%	.0%
SIMUCAD	1.1	.0	1.1	0	.2%	.0%	.4%	.0%
Data I/O	1.0	.0	1.0	0	.2%	.0%	.4%	.0%
Zuken	1.0	.4	.6	6	.2%	.3%	.2%	.1%
Solbourne	.9	.9	.0	179	.2%	.6%	.0%	1.8%
Autodesk	.8	.0	.8	0	.1%	.0%	.3%	.0%
Cascade Design Automation	.7	.0	.5	0	.1%	.0%	.2%	.0%
Microsim	.6	.0	.5	0	.1%	.0%	.2%	.0%
Compact Software	.6	.0	.6	0	.1%	.0%	.2%	.0%
Silvar-Llaco	.5	.0	.3	0	.1%	.0%	.1%	.0%
National Semiconductor	.5	.1	.4	4	.1%	.1%	.1%	.0%
Phase Three Logic	.5	.0	.4	0	.1%	.0%	.2%	.0%
NCR Microelectronics	.4	.0	.4	0	.1%	.0%	.1%	.0%

(Continued)

Table 32 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Technical Workstation
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Everex Systems	.4	.4	.0	49	.1%	.3%	.0%	.5%
CAD Language Systems	.3	.0	.3	0	.1%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.2	.0	.2	0	.0%	.0%	.1%	.0%
Infinite Graphics	.2	.0	.2	0	.0%	.0%	.1%	.0%
Sierra Semiconductor	.1	.0	.1	0	.0%	.0%	.0%	.0%
Simutest	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	543.1	156.2	273.8	9,902	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	527.4	155.0	261.5	9,824	97.1%	99.2%	95.5%	99.2%
All Asian-Based Companies	1.0	.4	.6	6	.2%	.3%	.2%	.1%
All European-Based Companies	14.8	.8	11.8	71	2.7%	.5%	4.3%	.7%
All Hardware Companies	124.1	107.5	.0	7,993	22.8%	68.8%	.0%	80.7%
All Turnkey & SW Companies	419.1	48.7	273.8	1,908	77.2%	31.2%	100.0%	19.3%

Source: Dataquest (February 1992)

Table 33
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Host-Dependent
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	22.5	15.8	.4	0	38.7%	45.3%	3.1%	.0%
Cadence	5.3	.0	4.0	0	9.2%	.0%	31.3%	.0%
Intergraph	5.2	2.6	.8	48	9.0%	7.5%	6.5%	7.1%
Teradyne	4.0	.6	2.4	2	6.8%	1.6%	19.2%	.4%
LSI Logic	.9	.1	.7	2	1.6%	.3%	5.5%	.3%
COMPASS Design Automation-VLSI	.8	.7	1.2	3	1.4%	2.1%	9.3%	.4%
Scientific Calc.	.7	.2	.6	4	1.2%	.5%	4.5%	.6%
Meta-Software	.6	.0	.5	0	1.1%	.0%	4.2%	.0%
EEsof	.4	.0	.3	0	.6%	.0%	2.6%	.0%
Test Systems Strategies	.4	.0	.4	0	.6%	.0%	2.8%	.0%
Compact Software	.4	.0	.4	0	.6%	.0%	2.8%	.0%
Genrad	.3	.1	.2	1	.6%	.2%	1.8%	.1%
Data I/O	.3	.0	.3	0	.5%	.0%	2.2%	.0%
Analogy	.2	.0	.2	0	.4%	.0%	1.7%	.0%
Logic Automation	.2	.0	.2	0	.3%	.0%	1.4%	.0%
Computervision	.1	.0	.0	1	.2%	.1%	.2%	.2%
SIMUCAD	.1	.0	.1	0	.1%	.0%	.5%	.0%
Microsim	.1	.0	.1	0	.1%	.0%	.4%	.0%

(Continued)

Table 33 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	15.7	14.9	.0	615	26.9%	42.5%	.0%	90.9%
All Companies	58.1	35.0	12.7	676	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	58.1	35.0	12.7	676	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	37.6	30.7	.0	615	64.8%	87.8%	.0%	90.9%
All Turnkey & SW Companies	20.4	4.3	12.7	61	35.2%	12.2%	100.0%	9.1%

Source: Dataquest (February 1992)

Table 34
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zycad	19.5	15.4	.0	150	33.8%	32.9%	.0%	20.0%
Sun	13.1	10.8	.0	292	22.7%	23.1%	.0%	39.1%
Digital	10.4	7.5	.0	0	18.0%	15.9%	.0%	.0%
Ikos Systems	7.8	7.8	.0	37	13.6%	16.7%	.0%	4.9%
Solbourne	2.4	2.4	.0	97	4.1%	5.1%	.0%	13.0%
Intergraph	2.2	1.1	.5	22	3.8%	2.3%	88.1%	3.0%
Hewlett-Packard	2.0	1.7	.0	99	3.5%	3.6%	.0%	13.2%
IBM	.2	.2	.0	52	.4%	.4%	.0%	6.9%
SIMUCAD	.1	.0	.1	0	.1%	.0%	11.9%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	57.7	46.9	.6	748	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	57.7	46.9	.6	748	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	36.0	30.4	.0	577	62.3%	64.8%	.0%	77.0%
All Turnkey & SW Companies	21.7	16.5	.6	172	37.7%	35.2%	100.0%	23.0%

Source: Dataquest (February 1992)

Table 35
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE Platform: Personal Computer Region: North America Units: Millions of U.S. Dollars/Actual Units		Market Share							
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	
Compaq	36.3	36.3	.0	6,214	22.8%	46.0%	.0%	37.2%	
Viewlogic Systems	14.8	.0	12.5	0	9.3%	.0%	17.7%	.0%	
IBM	10.8	10.3	.0	2,539	6.8%	13.0%	.0%	15.2%	
Xilinx	10.5	.0	9.5	0	6.6%	.0%	13.5%	.0%	
Hewlett-Packard	9.7	7.8	.0	1,675	6.1%	9.8%	.0%	10.0%	
Altera	7.9	.0	6.7	0	5.0%	.0%	9.6%	.0%	
Autodesk	6.4	.0	6.4	0	4.0%	.0%	9.1%	.0%	
ACTEL	6.2	.0	5.6	0	3.9%	.0%	7.9%	.0%	
Apple Computer	5.7	5.1	.0	1,203	3.6%	6.4%	.0%	7.2%	
Microsim	5.1	.0	4.8	0	3.2%	.0%	6.9%	.0%	
Data I/O	4.1	.0	4.1	0	2.6%	.0%	5.9%	.0%	
EEsof	3.5	.0	3.2	0	2.2%	.0%	4.5%	.0%	
Everex Systems	3.4	3.4	.0	1,089	2.1%	4.3%	.0%	6.5%	
Orcad	2.6	.0	2.6	0	1.6%	.0%	3.7%	.0%	
Racal-Redac	2.2	.0	2.1	0	1.4%	.0%	3.0%	.0%	
ALDEC	1.9	.0	1.9	0	1.2%	.0%	2.7%	.0%	
Teradyne	1.4	.0	1.0	0	.9%	.0%	1.5%	.0%	
Phase Three Logic	1.3	.0	1.1	0	.8%	.0%	1.6%	.0%	
Dell Computer	1.2	1.2	.0	322	.8%	1.6%	.0%	1.9%	
Spectrum Software	1.0	.0	1.0	0	.6%	.0%	1.4%	.0%	
Intrinsic	1.0	1.0	.0	10	.6%	1.3%	.0%	.1%	
Ormaton	.8	.0	.8	0	.5%	.0%	1.1%	.0%	
Douglas Electronics	.8	.0	.8	0	.5%	.0%	1.1%	.0%	
Infinite Graphics	.7	.0	.7	0	.4%	.0%	.9%	.0%	

(Continued)

(Continued)

Table 35 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Visionics	.7	.0	.5	3	.4%	.0%	.7%	.0%
Compact Software	.5	.0	.5	0	.3%	.0%	.7%	.0%
Capilano Computing	.5	.0	.5	0	.3%	.0%	.7%	.0%
PLUS Logic	.4	.0	.4	0	.3%	.0%	.6%	.0%
PADS Software	.4	.0	.4	0	.3%	.0%	.5%	.0%
Accel Technologies	.4	.0	.4	0	.3%	.0%	.5%	.0%
The CAD Group	.4	.0	.4	0	.2%	.0%	.5%	.0%
BV Engineering	.4	.0	.4	0	.2%	.0%	.5%	.0%
Tanner Research	.3	.0	.3	0	.2%	.0%	.4%	.0%
Foresight Resources	.3	.0	.2	0	.2%	.0%	.3%	.0%
American Small Business Comp.	.3	.0	.3	0	.2%	.0%	.4%	.0%
Digital	.2	.0	.2	0	.1%	.0%	.2%	.0%
Bobcat Systems	.2	.0	.2	0	.1%	.0%	.3%	.0%
SIMUCAD	.2	.0	.2	0	.1%	.0%	.3%	.0%
Simutest	.2	.0	.2	0	.1%	.0%	.3%	.0%
Cascade Graphics	.2	.0	.2	0	.1%	.0%	.2%	.0%
Vamp	.2	.0	.2	0	.1%	.0%	.2%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.1%	.0%
Genrad	.1	.0	.1	4	.1%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 35 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	14.1	13.8	.3	3,639	8.9%	17.5%	.4%	21.8%
All Companies	159.4	78.9	70.4	16,699	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	157.2	78.9	68.3	16,699	98.6%	100.0%	97.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	2.2	.0	2.1	0	1.4%	.0%	3.0%	.0%
All Hardware Companies	81.1	77.9	.0	16,682	50.9%	98.7%	.0%	99.9%
All Turnkey & SW Companies	78.3	1.0	70.4	17	49.1%	1.3%	100.0%	.1%

Source: Dataquest (February 1992)

Table 36
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware	
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Units Shipped
Mentor Graphics	69.1	20.0	29.0	7.8%	12.7%	7.8%	14.6%	7.8%	14.6%	2.8%
Hewlett-Packard	50.5	41.7	.0	16.3%	9.3%	16.3%	.0%	16.3%	.0%	19.0%
Sun	46.1	40.0	.0	15.7%	8.5%	15.7%	.0%	15.7%	.0%	8.9%
Compaq	41.4	41.4	.0	16.2%	7.6%	16.2%	.0%	16.2%	.0%	29.4%
Digital	33.1	23.8	.0	9.3%	6.1%	9.3%	.0%	9.3%	.0%	1.0%
Intergraph	29.7	7.2	10.8	2.8%	5.4%	2.8%	5.5%	2.8%	5.5%	.9%
Siemens Nixdorf Info systems	23.7	11.8	8.3	4.6%	4.4%	4.6%	4.2%	4.6%	4.2%	1.3%
Valid	18.9	.7	12.0	.3%	3.5%	.3%	6.0%	.3%	6.0%	.2%
Racal-Redac	15.3	.7	12.5	.3%	2.8%	.3%	6.3%	.3%	6.3%	.3%
IBM	14.7	14.0	.0	5.5%	2.7%	5.5%	.0%	5.5%	.0%	14.3%
Cadence	14.2	.0	10.6	.0%	2.6%	.0%	5.4%	.0%	5.4%	.0%
Computervision	12.5	5.1	3.0	2.0%	2.3%	2.0%	1.5%	2.0%	1.5%	.5%
Aucotec	11.4	4.0	6.3	1.6%	2.1%	1.6%	3.2%	1.6%	3.2%	.8%
HP Cade	10.7	6.4	3.2	2.5%	2.0%	2.5%	1.6%	2.5%	1.6%	.2%
Autodesk	10.0	.0	10.0	.0%	1.8%	.0%	5.0%	.0%	5.0%	.0%
COMPASS Design Automation-VLSI	9.2	.9	8.1	.4%	1.7%	.4%	4.1%	.4%	4.1%	.1%
Synopsys	8.4	.0	6.3	.0%	1.5%	.0%	3.2%	.0%	3.2%	.0%
ERSof	7.0	.0	6.2	.0%	1.3%	.0%	3.1%	.0%	3.1%	.0%
AnaCAD	4.5	.0	4.5	.0%	.8%	.0%	2.3%	.0%	2.3%	.0%
Zycad	4.5	3.6	.0	1.4%	.8%	1.4%	.0%	1.4%	.0%	.1%
Teradyne	4.4	.5	2.8	.2%	.8%	.2%	1.4%	.2%	1.4%	.0%
Ziegler	4.2	.0	4.2	.0%	.8%	.0%	2.1%	.0%	2.1%	.0%
Analogy	4.2	.0	3.8	.0%	.8%	.0%	1.9%	.0%	1.9%	.0%
Viewlogic Systems	4.0	.0	3.4	.0%	.7%	.0%	1.7%	.0%	1.7%	.0%

(Continued)

Table 36 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Platform: Region: Units:	Electronic CAE All Platforms Europe Millions of U.S. Dollars/Actual Units	Market Share									
Company		Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Hardware Units Shipped	Hardware Units Shipped
LSI Logic		3.9	.4	2.9	10	.7%	.2%	1.5%	.0%	.0%	.0%
Kloekner-Moeller		3.7	.9	2.6	130	.7%	.3%	1.3%	.5%	.5%	.5%
Altera		3.7	.0	3.1	0	.7%	.0%	1.6%	.0%	.0%	.0%
Logic Automation		3.5	.0	3.5	0	.6%	.0%	1.8%	.0%	.0%	.0%
Genrad		3.5	.7	2.3	35	.6%	.3%	1.2%	.1%	.1%	.1%
Orcad		3.5	.0	3.5	0	.6%	.0%	1.7%	.0%	.0%	.0%
Xilinx		3.2	.0	2.9	0	.6%	.0%	1.5%	.0%	.0%	.0%
Data I/O		2.9	.0	2.9	0	.5%	.0%	1.5%	.0%	.0%	.0%
Ikos Systems		2.6	2.6	.0	12	.5%	1.0%	.0%	.1%	.1%	.1%
ACTEL		2.5	.0	2.3	0	.5%	.0%	1.1%	.0%	.0%	.0%
Scientific Calc.		2.4	.2	1.7	7	.4%	.1%	.8%	.0%	.0%	.0%
Apple Computer		2.4	2.1	.0	504	.4%	.8%	.0%	2.1%	2.1%	2.1%
debis Systemhaus		2.4	.6	1.4	19	.4%	.2%	.7%	.1%	.1%	.1%
Vantage Analysis Systems		2.1	.0	1.8	0	.4%	.0%	.9%	.0%	.0%	.0%
ISDATA		2.0	.0	1.7	0	.4%	.0%	.9%	.0%	.0%	.0%
ALS Design		2.0	.2	1.8	37	.4%	.1%	.9%	.2%	.2%	.2%
Comdisco Systems		1.8	.0	1.6	0	.3%	.0%	.8%	.0%	.0%	.0%
Microsim		1.7	.0	1.6	0	.3%	.0%	.8%	.0%	.0%	.0%
Research Machines		1.7	1.7	.0	266	.3%	.6%	.0%	1.1%	1.1%	1.1%
X-TRA		1.6	.3	.7	70	.3%	.1%	.4%	.3%	.3%	.3%
Caditron		1.6	.8	.6	25	.3%	.3%	.3%	.1%	.1%	.1%
Quickturn Systems		1.4	1.4	.0	8	.3%	.5%	.0%	.0%	.0%	.0%
Test Systems Strategies		1.2	.0	1.1	0	.2%	.0%	.5%	.0%	.0%	.0%
Aucos elektronische Gerate		1.2	.4	.8	116	.2%	.1%	.4%	.5%	.5%	.5%

(Continued)

(Continued)

Table 36 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Serbi	1.1	.0	1.1	0	.2%	.0%	.6%	.0%
Compact Software	.9	.0	.6	0	.2%	.0%	.3%	.0%
ISKA	.9	.4	.4	16	.2%	.2%	.2%	.1%
I-Logix	.8	.0	.8	0	.2%	.0%	.4%	.0%
DAT Standard info ssystems	.8	.0	.7	0	.1%	.0%	.4%	.0%
Inca	.7	.7	.0	3	.1%	.3%	.0%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.1%	.0%	.4%	.0%
Dell Computer	.6	.6	.0	166	.1%	.3%	.0%	.7%
Technische Computer Systeme	.6	.1	.5	16	.1%	.0%	.2%	.1%
Solbourne	.5	.5	.0	47	.1%	.2%	.0%	.2%
Silvar-Lisco	.5	.0	.3	0	.1%	.0%	.1%	.0%
ALDEC	.5	.0	.5	0	.1%	.0%	.3%	.0%
National Semiconductor	.5	.1	.4	4	.1%	.0%	.2%	.0%
Omaton	.4	.0	.4	0	.1%	.0%	.2%	.0%
Everex Systems	.3	.3	.0	101	.1%	.1%	.0%	.4%
Motorola	.3	.0	.3	0	.1%	.0%	.2%	.0%
Foresight Resources	.3	.0	.2	0	.0%	.0%	.1%	.0%
PADS Software	.3	.0	.2	0	.0%	.0%	.1%	.0%
Zuken	.2	.1	.1	1	.0%	.0%	.1%	.0%
DAPCO	.2	.0	.1	0	.0%	.0%	.1%	.0%
CAD Language Systems	.2	.0	.1	0	.0%	.0%	.1%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.0%	.0%	.1%	.0%
Number One Systems	.1	.0	.1	3	.0%	.0%	.1%	.0%

(Continued)

Table 36 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cascade Design Automation	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accel Technologies	.1	.0	.1	0	.0%	.0%	.0%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.0%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	22.4	18.7	4.1	3,266	4.1%	7.3%	2.1%	13.6%
All Companies	544.8	255.7	198.4	24,074	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	454.2	226.6	145.4	22,757	83.4%	88.6%	73.3%	94.5%
All Asian-Based Companies	.2	.1	.1	1	.0%	.0%	.1%	.0%
All European-Based Companies	90.5	29.0	52.9	1,316	16.6%	11.3%	26.7%	5.5%
All Hardware Companies	214.2	188.7	.0	21,583	39.3%	73.8%	.0%	89.7%
All Turnkey & SW Companies	330.6	67.0	198.4	2,491	60.7%	26.2%	100.0%	10.3%

Source: Dataquest (February 1992)

Table 37
1991 Preliminary CAD/CAM/CAE Market Share

Application: Platform: Region: Units:	Electronic CAE Technical Workstation Europe Millions of U.S. Dollars/Actual Units	Market Share									
Company	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Software Revenue	Hardware Units Shipped	
Mentor Graphics	69.1	20.0	29.0	671	20.7%	16.1%	21.1%	10.9%			
Sun	39.2	34.3	.0	1,988	11.7%	27.6%	.0%	32.2%			
Hewlett-Packard	35.9	30.0	.0	2,301	10.8%	24.1%	.0%	37.3%			
Intergraph	26.3	5.6	10.2	188	7.9%	4.5%	7.4%	3.1%			
Siemens Nixdorf Info systems	23.7	11.8	8.3	324	7.1%	9.5%	6.1%	5.3%			
Valid	18.9	.7	12.0	42	5.7%	.5%	8.7%	.7%			
Racal-Redac	13.3	.7	10.6	62	4.0%	.6%	7.7%	1.0%			
Cadence	13.1	.0	9.8	0	3.9%	.0%	7.1%	.0%			
Computervision	12.3	5.0	2.9	116	3.7%	4.0%	2.1%	1.9%			
HP Carte	10.7	6.4	3.2	46	3.2%	5.1%	2.3%	.8%			
COMPASS Design Automation-VLSI	8.5	.3	7.0	17	2.5%	.2%	5.1%	.3%			
Synopsys	8.4	.0	6.3	0	2.5%	.0%	4.6%	.0%			
Digital	6.2	4.4	.0	230	1.8%	3.6%	.0%	3.7%			
AmiCAD	4.5	.0	4.5	0	1.4%	.0%	3.3%	.0%			
EEsof	4.0	.0	3.5	5	1.2%	.0%	2.6%	.1%			
Analogy	4.0	.0	3.6	0	1.2%	.0%	2.6%	.0%			
LSI Logic	3.5	.4	2.6	9	1.0%	.3%	1.9%	.1%			
Logic Automation	3.5	.0	3.5	0	1.0%	.0%	2.5%	.0%			
Aucotec	3.4	1.2	1.9	39	1.0%	1.0%	1.4%	.6%			
Genrad	3.0	.6	2.0	29	.9%	.5%	1.5%	.5%			
Vantage Analysis Systems	2.1	.0	1.8	0	.6%	.0%	1.3%	.0%			
Teradyne	2.0	.3	1.3	7	.6%	.2%	.9%	.1%			
Scientific Calc.	1.8	.2	1.1	7	.6%	.1%	.8%	.1%			
debits Systemshaus	1.8	.5	1.1	11	.5%	.4%	.8%	.2%			

(Continued)

(Continued)

Table 37 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Viewlogic Systems	1.8	.0	1.5	0	.5%	.0%	1.1%	.0%
Comdisco Systems	1.8	.0	1.6	0	.5%	.0%	1.2%	.0%
Quickturn Systems	1.4	1.4	.0	8	.4%	1.1%	.0%	.1%
Test Systems Strategies	1.1	.0	1.0	0	.3%	.0%	.7%	.0%
Autodesk	1.1	.0	1.1	0	.3%	.0%	.8%	.0%
ISKA	.9	.4	.4	16	.3%	.3%	.3%	.3%
i-Logix	.8	.0	.8	0	.2%	.0%	.6%	.0%
Scientific & Engineering SW	.7	.0	.7	0	.2%	.0%	.5%	.0%
Data I/O	.6	.0	.6	0	.2%	.0%	.4%	.0%
Silvar-Lisco	.5	.0	.3	0	.2%	.0%	.2%	.0%
ACTEL	.5	.0	.5	0	.1%	.0%	.3%	.0%
National Semiconductor	.4	.1	.4	4	.1%	.1%	.3%	.1%
ISDATA	.4	.0	.4	0	.1%	.0%	.3%	.0%
Technische Computer Systeme	.4	.1	.3	11	.1%	.1%	.2%	.2%
Compact Software	.4	.0	.4	0	.1%	.0%	.3%	.0%
Xilinx	.3	.0	.3	0	.1%	.0%	.2%	.0%
Motorola	.3	.0	.3	0	.1%	.0%	.2%	.0%
Inca	.2	.2	.0	1	.1%	.2%	.0%	.0%
Zuken	.2	.1	.1	1	.1%	.1%	.1%	.0%
ALS Design	.2	.0	.2	0	.1%	.0%	.1%	.0%
Microsim	.2	.0	.2	0	.1%	.0%	.1%	.0%
DAPCO	.2	.0	.1	0	.1%	.0%	.1%	.0%
CAD Language Systems	.2	.0	.1	0	.0%	.0%	.1%	.0%
Solbourne	.1	.1	.0	30	.0%	.1%	.0%	.5%

(Continued)

Table 37 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cascade Design Automation	.1	.0	.1	0	.0%	.0%	.1%	.0%
Meta-Software	.1	.0	.1	0	.0%	.0%	.1%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.0%	.0%
Serbi	.1	.0	.1	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	4	.0%	.0%	.0%	.1%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	334.1	124.5	137.7	6,167	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	274.1	103.1	106.5	5,655	82.0%	82.8%	77.4%	91.7%
All Asian-Based Companies	.2	.1	.1	1	.1%	.1%	.1%	.0%
All European-Based Companies	59.8	21.3	31.1	511	17.9%	17.1%	22.6%	8.3%
All Hardware Companies	83.1	70.5	.0	4,562	24.9%	56.7%	.0%	74.0%
All Turnkey & SW Companies	251.0	54.0	137.7	1,605	75.1%	43.3%	100.0%	26.0%

Source: Dataquest (February 1992)

Table 38
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	18.3	13.2	.0	0	51.6%	55.5%	.0%	.0%
Intergraph	2.3	1.2	.4	22	6.6%	5.0%	5.7%	6.0%
Teradyne	1.8	.2	1.1	1	4.9%	1.0%	16.7%	.3%
Cadence	1.1	.0	.9	0	3.2%	.0%	13.1%	.0%
COMPASS Design Automation-VLSI	.7	.7	1.1	2	2.1%	2.9%	16.5%	.6%
LSI Logic	.4	.0	.3	1	1.1%	.2%	4.5%	.2%
Genrad	.3	.1	.2	1	1.0%	.3%	3.6%	.3%
debis Systemhaus	.3	.1	.2	2	.8%	.3%	2.6%	.4%
EPsof	.3	.0	.3	0	.8%	.0%	3.9%	.0%
Computervision	.3	.1	.0	8	.7%	.3%	.6%	2.2%
Compact Software	.2	.0	.2	0	.6%	.0%	3.6%	.0%
Analogy	.2	.0	.2	0	.6%	.0%	2.9%	.0%
ISDATA	.2	.0	.1	0	.4%	.0%	2.2%	.0%
Data I/O	.2	.0	.2	0	.4%	.0%	2.3%	.0%
Test Systems Strategies	.1	.0	.1	0	.3%	.0%	1.9%	.0%
MacNeal-Schwendler	.1	.0	.1	0	.3%	.0%	1.4%	.0%
Logic Automation	.1	.0	.1	0	.2%	.0%	1.1%	.0%
Microsim	.0	.0	.0	0	.1%	.0%	.3%	.0%
Meta-Software	.0	.0	.0	0	.1%	.0%	.2%	.0%

(Continued)

Table 38 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	8.6	8.2	1.1	338	24.2%	34.5%	17.0%	90.0%
All Companies	35.5	23.7	6.5	376	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	35.1	23.7	5.1	374	98.8%	99.7%	78.2%	99.6%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.4	.1	1.4	2	1.2%	.3%	21.8%	.4%
All Hardware Companies	26.9	21.4	.0	338	75.9%	90.0%	.0%	90.0%
All Turnkey & SW Companies	8.6	2.4	6.5	38	24.1%	10.0%	100.0%	10.0%

Source: Dataquest (February 1992)

Table 39
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Server
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	8.6	6.2	.0	0	29.0%	29.7%	.0%	.0%
Sun	6.9	5.7	.0	152	23.3%	27.3%	.0%	38.7%
Zycad	4.5	3.6	.0	34	15.2%	17.0%	.0%	8.8%
Ikos Systems	2.6	2.6	.0	12	8.8%	12.5%	.0%	3.1%
Hewlett-Packard	2.0	1.7	.0	99	6.8%	7.9%	.0%	25.2%
Intergraph	1.0	.5	.2	10	3.3%	2.4%	7.1%	2.4%
Solbourne	.4	.4	.0	16	1.3%	1.9%	.0%	4.2%
IBM	.3	.3	.0	69	1.0%	1.3%	.0%	17.6%
MacNeal-Schwendler	.1	.0	.1	0	.2%	.0%	1.5%	.0%
Other Companies	3.3	.0	3.0	0	11.1%	.0%	91.4%	.0%
All Companies	29.7	21.0	3.3	392	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	29.7	21.0	3.3	392	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	20.9	16.9	.0	348	70.2%	80.6%	.0%	88.8%
All Turnkey & SW Companies	8.8	4.1	3.3	44	29.8%	19.4%	100.0%	11.2%

Source: Dataquest (February 1992)

Table 40
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	41.4	41.4	.0	7,081	28.4%	47.9%	.0%	41.3%
IBM	14.4	13.7	.0	3,386	9.9%	15.9%	.0%	19.8%
Hewlett-Packard	12.6	10.1	.0	2,168	8.6%	11.6%	.0%	12.7%
Autodesk	8.9	.0	8.9	0	6.1%	.0%	17.5%	.0%
Aucotec	8.0	2.8	4.4	142	5.5%	3.2%	8.6%	.8%
Ziegler	4.2	.0	4.2	0	2.9%	.0%	8.3%	.0%
Kloeckner-Moeller	3.7	.9	2.6	130	2.6%	1.0%	5.2%	.8%
Altera	3.7	.0	3.1	0	2.5%	.0%	6.1%	.0%
Orcad	3.5	.0	3.5	0	2.4%	.0%	6.8%	.0%
Xilinx	2.9	.0	2.6	0	2.0%	.0%	5.1%	.0%
EEsof	2.7	.0	2.4	0	1.8%	.0%	4.7%	.0%
Apple Computer	2.4	2.1	.0	504	1.7%	2.5%	.0%	2.9%
Viewlogic Systems	2.2	.0	1.9	0	1.5%	.0%	3.7%	.0%
Data I/O	2.2	.0	2.2	0	1.5%	.0%	4.3%	.0%
ACTEL	2.0	.0	1.8	0	1.4%	.0%	3.5%	.0%
Racal-Redac	2.0	.0	1.9	0	1.4%	.0%	3.7%	.0%
ALS Design	1.8	.2	1.6	37	1.2%	.2%	3.1%	.2%
Research Machines	1.7	1.7	.0	266	1.1%	1.9%	.0%	1.6%
X-TRA	1.6	.3	.7	70	1.1%	.4%	1.5%	.4%
Caditron	1.6	.8	.6	25	1.1%	.9%	1.3%	.1%
Microsim	1.5	.0	1.4	0	1.0%	.0%	2.8%	.0%
ISDATA	1.4	.0	1.2	0	1.0%	.0%	2.4%	.0%
Aucos elektronische Gerate	1.2	.4	.8	116	.8%	.4%	1.6%	.7%

(Continued)

Table 40 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Serbi	1.1	.0	1.1	0	.7%	.0%	2.1%	.0%
DAT Standard Info ssystemes	.8	.0	.7	0	.5%	.0%	1.4%	.0%
Dell Computer	.6	.6	.0	166	.4%	.7%	.0%	1.0%
Teradyne	.6	.0	.5	0	.4%	.0%	.9%	.0%
Scientific Calc.	.6	.0	.6	0	.4%	.0%	1.2%	.0%
ALDEC	.5	.0	.5	0	.3%	.0%	1.0%	.0%
Inca	.5	.5	.0	2	.3%	.6%	.0%	.0%
Omaton	.4	.0	.4	0	.3%	.0%	.8%	.0%
Compact Software	.3	.0	.0	0	.2%	.0%	.0%	.0%
Everex Systems	.3	.3	.0	97	.2%	.3%	.0%	.6%
debis Systemhaus	.3	.1	.2	6	.2%	.1%	.3%	.0%
PADS Software	.3	.0	.2	0	.2%	.0%	.4%	.0%
Foresight Resources	.3	.0	.2	0	.2%	.0%	.5%	.0%
Technische Computer Systeme	.2	.0	.1	5	.1%	.0%	.3%	.0%
Number One Systems	.1	.0	.1	3	.1%	.0%	.3%	.0%
Genrad	.1	.0	.1	4	.1%	.0%	.1%	.0%
Accel Technologies	.1	.0	.1	0	.0%	.0%	.1%	.0%
Tanner Research	.1	.0	.1	0	.0%	.0%	.1%	.0%
National Semiconductor	.1	.0	.1	0	.0%	.0%	.1%	.0%
Cascade Graphics	.0	.0	.0	0	.0%	.0%	.1%	.0%
Masta Corporation	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 40 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	10.7	10.7	.1	2,928	7.4%	12.3%	.1%	17.1%
All Companies	145.5	86.5	51.0	17,139	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	115.3	78.9	30.6	16,335	79.3%	91.2%	60.0%	95.3%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	30.2	7.6	20.4	804	20.7%	8.8%	40.0%	4.7%
All Hardware Companies	83.4	79.9	.0	16,334	57.3%	92.3%	.0%	95.3%
All Turnkey & SW Companies	62.2	6.6	51.0	804	42.7%	7.7%	100.0%	4.7%

Source: Dataquest (February 1992)

Table 41
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Total Factory Revenue	Hardware Revenue	Software Revenue	
Mentor Graphics	57.3	16.6	24.1	9.7%	14.3%	14.5%	9.7%	14.3%	4.1%
NEC	46.2	30.8	11.7	18.0%	7.0%	11.7%	18.0%	7.0%	21.3%
Wacom	36.6	7.3	25.5	4.3%	15.2%	9.3%	4.3%	15.2%	4.5%
Sun	32.7	28.4	.0	16.6%	.0%	8.3%	16.6%	.0%	16.2%
Fujitsu	30.6	19.0	8.6	11.1%	5.1%	7.7%	11.1%	5.1%	5.1%
Valid	22.3	.0	18.3	.0%	10.9%	5.6%	.0%	10.9%	.0%
Hewlett-Packard	20.7	17.1	.0	10.0%	.0%	5.2%	10.0%	.0%	13.9%
Zuken	18.8	7.5	11.3	4.4%	6.7%	4.8%	4.4%	6.7%	.8%
Cadence	14.4	.0	14.4	.0%	8.6%	3.6%	.0%	8.6%	.0%
Intergraph	10.6	2.3	4.0	1.3%	2.4%	2.7%	1.3%	2.4%	.6%
IBM	9.2	8.8	.0	5.1%	.0%	2.3%	5.1%	.0%	16.0%
Synopsys	8.4	.0	6.3	.0%	3.7%	2.1%	.0%	3.7%	.0%
Digital	8.2	5.4	.5	3.1%	.3%	2.1%	3.1%	.3%	.4%
Zycad	6.0	4.7	.0	2.8%	.0%	1.5%	2.8%	.0%	.3%
Viewlogic Systems	5.8	.0	4.9	.0%	2.9%	1.5%	.0%	2.9%	.0%
Sophia Systems	5.3	1.3	3.4	.8%	2.0%	1.3%	.8%	2.0%	.6%
Effsof	4.1	.0	3.6	.0%	2.2%	1.0%	.0%	2.2%	.0%
Data I/O	3.8	.0	3.8	.0%	2.3%	1.0%	.0%	2.3%	.0%
Quickturn Systems	3.5	3.5	.0	2.0%	.0%	.9%	2.0%	.0%	.1%
Xilinx	2.7	.0	2.4	.0%	1.4%	.7%	.0%	1.4%	.0%
Ikos Systems	2.6	2.6	.0	1.5%	.0%	.7%	1.5%	.0%	.1%
Compaq	2.5	2.5	.0	1.5%	.0%	.6%	1.5%	.0%	3.2%

(Continued)

Table 41 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Contec Microelectronics	2.4	.0	2.2	0	.6%	.0%	1.3%	.0%
Tokyo Electron—NO OEM	2.2	.7	1.1	8	.6%	.4%	.6%	.1%
Autodesk	2.2	.0	2.2	0	.5%	.0%	1.3%	.0%
Sony	2.0	1.8	.0	118	.5%	1.0%	.0%	.9%
ACTEL	1.9	.0	1.8	0	.5%	.0%	1.0%	.0%
COMPASS Design Automation-VLSI	1.9	.2	1.7	4	.5%	.1%	1.0%	.0%
Century Research Center	1.9	1.0	.7	11	.5%	.6%	.4%	.1%
LSI Logic	1.6	.2	1.2	4	.4%	.1%	.7%	.0%
Meta-Software	1.6	.0	1.4	0	.4%	.0%	.8%	.0%
Comdisco Systems	1.5	.0	1.3	0	.4%	.0%	.8%	.0%
Logic Automation	1.4	.0	1.4	0	.4%	.0%	.8%	.0%
Teradyne	1.4	.2	.9	3	.4%	.1%	.5%	.0%
Altera	1.4	.0	1.2	0	.3%	.0%	.7%	.0%
Omron	1.4	1.2	.1	39	.3%	.7%	.1%	.3%
Test Systems Strategies	1.2	.0	1.1	0	.3%	.0%	.6%	.0%
Analogy	1.1	.0	1.0	0	.3%	.0%	.6%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.3%	.0%	.5%	.0%
Apple Computer	1.0	.9	.0	213	.3%	.5%	.0%	1.6%
Microsim	1.0	.0	1.0	0	.3%	.0%	.6%	.0%
Compact Software	.9	.0	.6	0	.2%	.0%	.4%	.0%
Silvar-Lisco	.9	.0	.5	0	.2%	.0%	.3%	.0%
Siemens Nixdorf Info systems	.7	.4	.3	10	.2%	.2%	.2%	.1%
Quantic Laboratories	.6	.0	.5	0	.1%	.0%	.3%	.0%

(Continued)

Table 41 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
I-Logix	.6	.0	.6	0	.1%	.0%	.3%	.0%
EPIC Design Technology	.4	.0	.3	0	.1%	.0%	.2%	.0%
Cascade Design Automation	.4	.0	.2	0	.1%	.0%	.1%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.1%	.0%	.2%	.0%
SIMUCAD	.3	.0	.3	0	.1%	.0%	.1%	.0%
PADS Software	.2	.0	.1	0	.0%	.0%	.1%	.0%
ALDEC	.1	.0	.1	0	.0%	.0%	.1%	.0%
Everex Systems	.1	.1	.0	25	.0%	.1%	.0%	.2%
Motorola	.1	.0	.1	0	.0%	.0%	.0%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.0%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%
Tanner Research	.0	.0	.0	0	.0%	.0%	.0%	.0%
The CAD Group	.0	.0	.0	0	.0%	.0%	.0%	.0%
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 41 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	7.4	7.2	.0	1,271	1.9%	4.2%	.0%	9.4%
All Companies	395.7	171.7	168.0	13,466	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	250.0	100.6	105.3	8,930	63.2%	58.6%	62.7%	66.3%
All Asian-Based Companies	145.0	70.7	62.4	4,525	36.6%	41.2%	37.1%	33.6%
All European-Based Companies	.8	.4	.3	11	.2%	.2%	.2%	.1%
All Hardware Companies	89.3	78.2	.0	8,356	22.6%	45.6%	.0%	62.1%
All Turnkey & SW Companies	306.5	93.4	168.0	5,110	77.4%	54.4%	100.0%	37.9%

Source: Dataquest (February 1992)

Table 42
1991 Preliminary CAD/CAM/CAE Market Share

Company	Total			Market Share			Hardware Units Shipped	Market Share			Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue		Factory Revenue	Hardware Revenue	Software Revenue	
Mentor Graphics	57.3	16.6	24.1	22.5%	17.1%	20.6%	557	22.5%	17.1%	20.6%	9.8%
NEC	29.1	16.3	10.5	11.4%	16.8%	9.0%	1,507	11.4%	16.8%	9.0%	26.7%
Sun	27.8	24.4	.0	10.9%	25.0%	.0%	1,993	10.9%	25.0%	.0%	35.3%
Valid	22.3	.0	18.3	8.8%	.0%	15.7%	0	8.8%	.0%	15.7%	.0%
Zuken	18.8	7.5	11.3	7.4%	7.7%	9.6%	110	7.4%	7.7%	9.6%	1.9%
Hewlett-Packard	14.1	11.8	.0	5.5%	12.1%	.0%	808	5.5%	12.1%	.0%	14.3%
Fujitsu	12.8	7.9	3.6	5.0%	8.2%	3.1%	301	5.0%	8.2%	3.1%	5.3%
Cadence	12.6	.0	12.6	4.9%	.0%	10.8%	0	4.9%	.0%	10.8%	.0%
Intergraph	9.9	1.9	3.9	3.9%	2.0%	3.4%	69	3.9%	2.0%	3.4%	1.2%
Synopsys	8.4	.0	6.3	3.3%	.0%	5.4%	0	3.3%	.0%	5.4%	.0%
Quickturn Systems	3.5	3.5	.0	1.4%	3.6%	.0%	19	1.4%	3.6%	.0%	.3%
Viewlogic Systems	2.6	.0	2.2	1.0%	.0%	1.9%	0	1.0%	.0%	1.9%	.0%
Wacom	2.5	.6	1.9	1.0%	.6%	1.6%	25	1.0%	.6%	1.6%	.4%
Contec Microelectronics	2.4	.0	2.2	.9%	.0%	1.8%	0	.9%	.0%	1.8%	.0%
HEsot	2.4	.0	2.1	.9%	.0%	1.8%	3	.9%	.0%	1.8%	.1%
Tokyo Electron—NO OEM	2.2	.7	1.1	.9%	.7%	.9%	8	.9%	.7%	.9%	.1%
Sony	2.0	1.8	.0	.8%	1.8%	.0%	118	.8%	1.8%	.0%	2.1%
Digital	1.9	1.0	.4	.7%	1.0%	.3%	52	.7%	1.0%	.3%	.9%
Century Research Center	1.9	1.0	.7	.7%	1.0%	.6%	11	.7%	1.0%	.6%	.2%
COMPASS Design Automation-VLSI	1.8	.1	1.5	.7%	.1%	1.2%	3	.7%	.1%	1.2%	.1%
Sophia Systems	1.6	.4	1.1	.6%	.4%	.9%	13	.6%	.4%	.9%	.2%
Comdisco Systems	1.5	.0	1.3	.6%	.0%	1.1%	0	.6%	.0%	1.1%	.0%
LSI Logic	1.4	.1	1.1	.5%	.1%	.9%	4	.5%	.1%	.9%	.1%
Logic Automation	1.4	.0	1.4	.5%	.0%	1.2%	0	.5%	.0%	1.2%	.0%

(Continued)

Table 42 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Meta-Software	1.4	.0	1.2	0	.5%	.0%	1.0%	.0%
Omron	1.4	1.2	.1	39	.5%	1.3%	.1%	.7%
Test Systems Strategies	1.1	.0	1.0	0	.4%	.0%	.8%	.0%
Vantage Analysis Systems	1.1	.0	.9	0	.4%	.0%	.8%	.0%
Analogy	1.0	.0	.9	0	.4%	.0%	.8%	.0%
Silvar-Lisco	.9	.0	.5	0	.3%	.0%	.4%	.0%
Siemens Nixdorf Info systems	.7	.4	.3	10	.3%	.4%	.2%	.2%
Data I/O	.7	.0	.7	0	.3%	.0%	.6%	.0%
Teradyne	.7	.1	.4	2	.3%	.1%	.4%	.0%
Quantic Laboratories	.6	.0	.5	0	.2%	.0%	.5%	.0%
I-Logix	.6	.0	.6	0	.2%	.0%	.5%	.0%
ACTEL	.4	.0	.4	0	.2%	.0%	.3%	.0%
Compact Software	.4	.0	.4	0	.1%	.0%	.3%	.0%
Scientific & Engineering SW	.4	.0	.4	0	.1%	.0%	.3%	.0%
EPIC Design Technology	.4	.0	.3	0	.1%	.0%	.3%	.0%
Cascade Design Automation	.4	.0	.2	0	.1%	.0%	.2%	.0%
Xilinx	.3	.0	.2	0	.1%	.0%	.2%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.2%	.0%
SIMUCAD	.2	.0	.2	0	.1%	.0%	.2%	.0%
Microsim	.1	.0	.1	0	.0%	.0%	.1%	.0%
Motorola	.1	.0	.1	0	.0%	.0%	.1%	.0%
CAD Language Systems	.1	.0	.1	0	.0%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
NCR Microelectronics	.1	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 42 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Technische Computer Systeme	.0	.0	.0	1	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	1	.0%	.0%	.0%	.0%
National Semiconductor	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	255.1	97.3	116.9	5,653	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	182.0	59.5	86.5	3,511	71.4%	61.1%	74.0%	62.1%
All Asian-Based Companies	72.3	37.5	30.2	2,131	28.3%	38.5%	25.8%	37.7%
All European-Based Companies	.8	.4	.3	11	.3%	.4%	.2%	.2%
All Hardware Companies	48.8	42.4	.0	2,991	19.1%	43.6%	.0%	52.9%
All Turnkey & SW Companies	206.2	54.9	116.9	2,662	80.9%	56.4%	100.0%	47.1%

Source: Dataquest (February 1992)

Table 43
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Host-Dependent
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	12.7	7.9	3.6	214	55.8%	55.6%	61.2%	63.6%
Digital	4.3	3.0	.1	0	18.7%	21.0%	1.7%	.0%
Teradyne	.6	.1	.4	0	2.5%	.6%	6.0%	.1%
Intergraph	.5	.3	.1	5	2.3%	1.8%	1.2%	1.6%
Cadence	.4	.0	.4	0	1.9%	.0%	7.4%	.0%
Compact Software	.2	.0	.2	0	1.0%	.0%	4.0%	.0%
Meta-Software	.2	.0	.2	0	.8%	.0%	2.8%	.0%
Data I/O	.2	.0	.2	0	.8%	.0%	3.3%	.0%
LSI Logic	.2	.0	.1	0	.7%	.1%	2.1%	.1%
EEsof	.2	.0	.2	0	.7%	.0%	2.6%	.0%
COMPASS Design Automation-VLSI	.2	.1	.2	1	.7%	1.0%	4.0%	.1%
Test Systems Strategies	.1	.0	.1	0	.5%	.0%	2.1%	.0%
Analogy	.1	.0	.1	0	.2%	.0%	.9%	.0%
Logic Automation	.0	.0	.0	0	.1%	.0%	.5%	.0%
Microsim	.0	.0	.0	0	.0%	.0%	.2%	.0%
SIMUCAD	.0	.0	.0	0	.0%	.0%	.2%	.0%

(Continued)

Table 43 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	3.0	2.8	.0	116	13.1%	19.9%	.0%	34.5%
All Companies	22.7	14.1	5.8	337	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	10.0	6.3	2.3	123	44.2%	44.4%	38.8%	36.4%
All Asian-Based Companies	12.7	7.9	3.6	214	55.8%	55.6%	61.2%	63.6%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	7.1	5.8	.0	116	31.2%	40.9%	.0%	34.5%
All Turnkey & SW Companies	15.6	8.4	5.8	221	68.8%	59.1%	100.0%	65.5%

Source: Dataquest (February 1992)

Table 44

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zycad	6.0	4.7	.0	46	33.5%	34.9%	.0%	14.4%
Sun	4.9	4.1	.0	186	27.4%	29.8%	.0%	58.1%
Ikos Systems	2.6	2.6	.0	12	14.6%	19.2%	.0%	3.8%
Digital	2.0	1.4	.0	0	10.9%	10.3%	.0%	.0%
Cadence	1.4	.0	1.4	0	7.8%	.0%	96.6%	.0%
Hewlett-Packard	.6	.5	.0	31	3.5%	3.9%	.0%	9.6%
Intergraph	.2	.1	.0	2	1.2%	.7%	2.8%	.7%
IBM	.2	.2	.0	43	1.1%	1.3%	.0%	13.5%
SIMUCAD	.0	.0	.0	0	.1%	.0%	.7%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	17.9	13.6	1.5	320	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	17.9	13.6	1.5	320	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	10.3	8.8	.0	272	57.4%	64.5%	.0%	85.0%
All Turnkey & SW Companies	7.6	4.8	1.5	48	42.6%	35.5%	100.0%	15.0%

Source: Dataquest (February 1992)

Table 45
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company	Total		Hardware		Software		Hardware		Total		Hardware		Software		Hardware		Software		Hardware	
	Factory	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Units	Shipped	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue
Wacom	34.2	6.7	23.7	578	34.1%	14.4%	54.0%	8.1%												
NEC	17.1	14.5	1.2	1,366	17.1%	31.2%	2.7%	19.1%												
IBM	9.0	8.6	.0	2,116	9.0%	18.4%	.0%	29.6%												
Hewlett-Packard	6.0	4.8	.0	1,035	6.0%	10.3%	.0%	14.5%												
Fujitsu	5.2	3.2	1.5	170	5.2%	6.9%	3.3%	2.4%												
Sophia Systems	3.7	.9	2.4	65	3.7%	1.9%	5.4%	.9%												
Viewlogic Systems	3.3	.0	2.7	0	3.2%	.0%	6.2%	.0%												
Data I/O	2.9	.0	2.9	0	2.9%	.0%	6.6%	.0%												
Compaq	2.5	2.5	.0	434	2.5%	5.4%	.0%	6.1%												
Xilinx	2.4	.0	2.2	0	2.4%	.0%	5.0%	.0%												
Autodesk	1.9	.0	1.9	0	1.9%	.0%	4.4%	.0%												
EEsof	1.6	.0	1.4	0	1.6%	.0%	3.2%	.0%												
ACTEL	1.6	.0	1.4	0	1.5%	.0%	3.2%	.0%												
Altera	1.4	.0	1.2	0	1.4%	.0%	2.6%	.0%												
Apple Computer	1.0	.9	.0	213	1.0%	1.9%	.0%	3.0%												
Microsim	.9	.0	.9	0	.9%	.0%	1.9%	.0%												
Compact Software	.3	.0	.0	0	.3%	.0%	.0%	.0%												
Teradyne	.2	.0	.2	0	.2%	.0%	.3%	.0%												
PADS Software	.2	.0	.1	0	.2%	.0%	.3%	.0%												
ALDEC	.1	.0	.1	0	.1%	.0%	.3%	.0%												
Everex Systems	.1	.1	.0	24	.1%	.2%	.0%	.3%												
Digital	.1	.0	.0	0	.1%	.0%	.1%	.0%												
Tanner Research	.0	.0	.0	0	.0%	.0%	.0%	.0%												
SIMUCAD	.0	.0	.0	0	.0%	.0%	.1%	.0%												

(Continued)

Table 45 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
The CAD Group	.0	.0	.0	0	.0%	.0%	.1%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.1%	.0%
Technische Computer Systeme	.0	.0	.0	0	.0%	.0%	.0%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	4.4	4.4	.0	1,155	4.4%	9.4%	.0%	16.1%
All Companies	100.0	46.6	43.9	7,156	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	40.0	21.3	15.1	4,976	39.9%	45.6%	34.5%	69.5%
All Asian-Based Companies	60.1	25.4	28.7	2,179	60.0%	54.4%	65.5%	30.5%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	23.0	21.3	.0	4,976	23.0%	45.6%	.0%	69.5%
All Turnkey & SW Companies	77.0	25.4	43.9	2,179	77.0%	54.4%	100.0%	30.5%

Source: Dataquest (February 1992)

Table 46
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE		Millions of U.S. Dollars/Actual Units										
Platform: All Platforms	Region: Rest of World	Units:										
		Total			Market Share				Hardware			
Company		Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq		4.2	4.2	.0	723	17.7%	28.9%	.0%				39.7%
Digital		2.5	1.8	.0	17	10.4%	12.2%	.0%				.9%
Hewlett-Packard		2.1	1.8	.0	193	8.9%	12.2%	.0%				10.6%
IBM		1.9	1.8	.0	432	7.8%	12.1%	.0%				23.7%
Intergraph		1.7	.9	.3	18	7.1%	6.0%	4.9%				1.0%
Sun		1.6	1.4	.0	101	6.7%	9.5%	.0%				5.6%
Orcad		1.3	.0	1.3	0	5.5%	.0%	20.1%				.0%
LSI Logic		.8	.1	.6	2	3.3%	.5%	8.9%				.1%
Genrad		.8	.1	.5	8	3.2%	1.0%	8.0%				.4%
Altera		.7	.0	.6	0	2.9%	.0%	8.9%				.0%
Analogy		.5	.0	.5	0	2.2%	.0%	7.2%				.0%
Data I/O		.5	.0	.5	0	2.1%	.0%	7.8%				.0%
Compact Software		.4	.0	.2	0	1.5%	.0%	3.5%				.0%
Xilinx		.4	.0	.3	0	1.5%	.0%	4.9%				.0%
ACTEL		.3	.0	.3	0	1.3%	.0%	4.4%				.0%
Comdisco Systems		.3	.0	.3	0	1.2%	.0%	4.0%				.0%
Siemens Nixdorf Info systems		.3	.1	.1	3	1.0%	.8%	1.4%				.2%
COMPASS Design Automation-VLSI		.2	.0	.2	0	.9%	.2%	2.8%				.0%
Teradyne		.2	.0	.2	0	.9%	.0%	2.8%				.0%
EEsof		.2	.0	.2	0	.9%	.0%	2.8%				.0%
Solbourne		.2	.2	.0	17	.8%	1.4%	.0%				.9%
Autodesk		.2	.0	.2	0	.8%	.0%	2.9%				.0%
Computervision		.2	.1	.1	2	.8%	.4%	.8%				.1%
Zuken		.1	.0	.1	1	.4%	.3%	.9%				.0%

(Continued)

(Continued)

Table 46 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Spectrum Software	.1	.0	.1	0	.4%	.0%	1.5%	.0%
Apple Computer	.1	.1	.0	19	.4%	.5%	.0%	1.1%
Caplano Computing	.1	.0	.1	0	.2%	.0%	.8%	.0%
Ziegler	.0	.0	.0	0	.1%	.0%	.3%	.0%
PADS Software	.0	.0	.0	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.2%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.2%	.0%
Other Companies	2.1	2.1	.0	286	8.9%	14.0%	.0%	15.7%
All Companies	23.8	14.6	6.5	1,822	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	23.5	14.4	6.4	1,818	98.4%	98.9%	97.4%	99.8%
All Asian-Based Companies	.1	.0	.1	1	.4%	.3%	.9%	.0%
All European-Based Companies	.3	.1	.1	3	1.1%	.8%	1.7%	.2%
All Hardware Companies	14.7	13.3	.0	1,788	61.5%	90.8%	.0%	98.1%
All Turnkey & SW Companies	9.2	1.3	6.5	34	38.5%	9.2%	100.0%	1.9%

Source: Dataquest (February 1992)

Table 47

1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company	Total				Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Hewlett-Packard	1.7	1.4	.0	136	21.6%	36.8%	.0%	47.9%
Sun	1.4	1.2	.0	96	17.2%	30.6%	.0%	33.7%
Intergraph	.8	.5	.2	9	10.5%	11.6%	5.8%	3.3%
LSI Logic	.7	.1	.5	2	8.9%	1.8%	19.3%	.6%
Genrad	.7	.1	.5	7	8.5%	3.3%	16.4%	2.3%
Analogy	.5	.0	.5	0	6.4%	.0%	16.4%	.0%
Digital	.5	.3	.0	17	5.8%	8.5%	.0%	6.1%
Comdisco Systems	.3	.0	.3	0	3.7%	.0%	9.5%	.0%
Siemens Nixdorf Info systems	.3	.1	.1	3	3.2%	3.1%	3.3%	1.2%
COMPASS Design Automation-VLSI	.2	.0	.2	0	2.5%	.3%	5.8%	.1%
Computervision	.2	.1	.1	2	2.4%	1.5%	1.8%	.8%
Compact Software	.1	.0	.1	0	1.8%	.0%	5.1%	.0%
EEsof	.1	.0	.1	0	1.5%	.0%	3.6%	.0%
Zuken	.1	.0	.1	1	1.3%	1.0%	2.2%	.2%
Teradyne	.1	.0	.1	0	1.3%	.0%	3.3%	.0%
Data I/O	.1	.0	.1	0	1.3%	.0%	3.6%	.0%
ACTEL	.1	.0	.1	0	.8%	.0%	2.2%	.0%
Solbourne	.1	.1	.0	11	.6%	1.5%	.0%	3.8%
Xilinx	.0	.0	.0	0	.5%	.0%	1.1%	.0%
Autodesk	.0	.0	.0	0	.3%	.0%	.7%	.0%

(Continued)

Table 47 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Technical Workstation
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	7.9	3.9	2.8	285	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	7.5	3.7	2.6	281	95.6%	95.9%	94.5%	98.6%
All Asian-Based Companies	.1	.0	.1	1	1.3%	1.0%	2.2%	.2%
All European-Based Companies	.3	.1	.1	3	3.2%	3.1%	3.3%	1.2%
All Hardware Companies	3.6	3.0	.0	261	45.2%	77.4%	.0%	91.4%
All Turnkey & SW Companies	4.3	.9	2.8	24	54.8%	22.6%	100.0%	8.6%

Source: Dataquest (February 1992)

Table 48
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Host-Dependent
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.4	1.0	.0	0	38.1%	40.1%	.0%	.0%
Intergraph	.6	.3	.1	6	16.9%	12.1%	23.3%	10.4%
Compact Software	.1	.0	.1	0	2.5%	.0%	20.9%	.0%
LSI Logic	.1	.0	.1	0	2.2%	.4%	11.6%	.3%
Teradyne	.1	.0	.1	0	2.2%	.0%	14.0%	.0%
Genrad	.1	.0	.1	0	2.2%	.4%	11.6%	.4%
Data I/O	.0	.0	.0	0	.8%	.0%	7.0%	.0%
Analogy	.0	.0	.0	0	.8%	.0%	4.7%	.0%
COMPASS Design Automation-VLSI	.0	.0	.0	0	.6%	.8%	4.7%	.1%
EEsof	.0	.0	.0	0	.3%	.0%	2.3%	.0%
Other Companies	1.2	1.1	.0	47	33.3%	46.2%	.0%	88.7%
All Companies	3.6	2.5	.4	53	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.6	2.5	.4	53	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.6	2.1	.0	47	71.4%	86.2%	.0%	88.7%
All Turnkey & SW Companies	1.0	.3	.4	6	28.6%	13.8%	100.0%	11.3%

Source: Dataquest (February 1992)

Table 49
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Server
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	.7	.5	.0	0	44.2%	42.6%	.0%	.0%
Intergraph	.3	.1	.1	3	17.0%	11.1%	100.0%	8.8%
Sun	.2	.2	.0	5	16.3%	18.5%	.0%	18.0%
Solbourne	.2	.1	.0	6	10.2%	13.0%	.0%	20.0%
Hewlett-Packard	.1	.1	.0	7	9.5%	11.1%	.0%	23.9%
IBM	.0	.0	.0	9	2.7%	3.7%	.0%	29.2%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	1.5	1.1	.1	30	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.5	1.1	.1	30	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.2	1.0	.0	27	83.0%	88.9%	.0%	91.2%
All Turnkey & SW Companies	.3	.1	.1	3	17.0%	11.1%	100.0%	8.8%

Source: Dataquest (February 1992)

Table 50
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	4.2	4.2	.0	723	38.7%	58.9%	.0%	49.7%
IBM	1.8	1.7	.0	423	16.6%	24.0%	.0%	29.1%
Orcad	1.3	.0	1.3	0	12.0%	.0%	39.9%	.0%
Altera	.7	.0	.6	0	6.2%	.0%	17.7%	.0%
Data I/O	.4	.0	.4	0	3.5%	.0%	11.6%	.0%
Xilinx	.3	.0	.3	0	2.9%	.0%	8.8%	.0%
Hewlett-Packard	.3	.2	.0	49	2.7%	3.2%	.0%	3.4%
ACTEL	.3	.0	.2	0	2.3%	.0%	7.0%	.0%
Autodesk	.2	.0	.2	0	1.6%	.0%	5.2%	.0%
Compact Software	.1	.0	.0	0	1.2%	.0%	.0%	.0%
Spectrum Software	.1	.0	.1	0	.9%	.0%	3.0%	.0%
Apple Computer	.1	.1	.0	19	.8%	1.1%	.0%	1.3%
EEsof	.1	.0	.1	0	.7%	.0%	2.1%	.0%
Capilano Computing	.1	.0	.1	0	.5%	.0%	1.5%	.0%
Teradyne	.0	.0	.0	0	.3%	.0%	.9%	.0%
Ziegler	.0	.0	.0	0	.2%	.0%	.6%	.0%
Genrad	.0	.0	.0	1	.2%	.0%	.6%	.1%
PADS Software	.0	.0	.0	0	.2%	.0%	.3%	.0%
Accel Technologies	.0	.0	.0	0	.1%	.0%	.3%	.0%
American Small Business Comp.	.0	.0	.0	0	.1%	.0%	.3%	.0%

(Continued)

Table 50 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: Electronic CAE
Platform: Personal Computer
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.9	.9	.0	239	8.3%	12.7%	.0%	16.4%
All Companies	10.9	7.2	3.3	1,454	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	10.9	7.2	3.3	1,454	99.8%	100.0%	99.4%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.2%	.0%	.6%	.0%
All Hardware Companies	7.3	7.2	.0	1,453	67.2%	100.0%	.0%	99.9%
All Turnkey & SW Companies	3.6	.0	3.3	1	32.8%	.0%	100.0%	.1%

Source: Dataquest (February 1992)

Table 51
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	133.8	.0	116.4	0	27.9%	.0%	58.3%	.0%
Sun	111.9	97.5	.0	6,880	23.3%	48.7%	.0%	61.6%
Mentor Graphics	73.2	21.2	30.7	711	15.3%	10.6%	15.4%	6.4%
Digital	36.8	26.4	.0	255	7.7%	13.2%	.0%	2.3%
Seiko Instruments—NO DATA	30.3	13.0	13.8	193	6.3%	6.5%	6.9%	1.7%
Hewlett-Packard	12.9	10.7	.0	1,160	2.7%	5.3%	.0%	10.4%
Valid	12.2	.3	9.1	31	2.5%	.1%	4.6%	.3%
Fujitsu	11.9	10.7	.0	265	2.5%	5.4%	.0%	2.4%
COMPASS Design Automation—VLSI	10.5	1.0	9.3	22	2.2%	.5%	4.6%	.2%
Solbourne	9.0	8.9	.0	775	1.9%	4.5%	.0%	6.9%
Silvar-Lisco	7.6	.0	4.2	0	1.6%	.0%	2.1%	.0%
NEC	4.6	2.6	1.7	239	1.0%	1.3%	.8%	2.1%
Cascade Design Automation	4.4	.0	3.0	0	.9%	.0%	1.5%	.0%
Sagantec	4.0	.0	3.6	0	.8%	.0%	1.8%	.0%
Integrated Silicon Systems	3.0	.5	2.5	18	.6%	.3%	1.2%	.2%
LSI Logic	1.9	.2	1.4	5	.4%	.1%	.7%	.0%
Sony	1.6	1.4	.0	94	.3%	.7%	.0%	.8%
Emerald Design Systems	1.5	.7	.6	24	.3%	.4%	.3%	.2%
Ontos	1.3	.0	1.3	0	.3%	.0%	.6%	.0%
Everex Systems	1.2	1.2	.0	345	.2%	.6%	.0%	3.1%
Tanner Research	1.0	.0	.9	0	.2%	.0%	.4%	.0%
National Semiconductor	.5	.1	.4	3	.1%	.0%	.2%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.2%	.0%
Objectivity	.3	.0	.3	0	.1%	.0%	.2%	.0%

(Continued)

Table 51 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	4.2	3.8	.2	154	.9%	1.9%	.1%	1.4%
All Companies	479.8	200.2	199.7	11,174	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	427.4	172.5	180.6	10,383	89.1%	86.1%	90.4%	92.9%
All Asian-Based Companies	48.4	27.8	15.5	791	10.1%	13.9%	7.7%	7.1%
All European-Based Companies	4.0	.0	3.6	0	.8%	.0%	1.8%	.0%
All Hardware Companies	177.3	149.8	.0	9,663	37.0%	74.8%	.0%	86.5%
All Turnkey & SW Companies	302.5	50.4	199.7	1,511	63.0%	25.2%	100.0%	13.5%

Source: Dataquest (February 1992)

Table 52
1991 Preliminary CAD/CAM/CAE Market Share

Application: Platform: Region: Units:		IC Layout Technical Workstation Worldwide	Millions of U.S. Dollars/Actual Units														
Company		Total			Hardware			Software		Hardware		Total		Market Share		Hardware	
		Factory	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Units Shipped
	Cadence		115.2	.0	100.4	0	29.2%	.0%	55.9%	.0%							.0%
	Sun		100.7	88.2	.0	6,598	25.6%	59.5%	.0%								66.6%
	Mentor Graphics		73.2	21.2	30.7	711	18.6%	14.3%	17.1%								7.2%
	Seiko Instruments—NO OEM		26.9	11.6	12.7	180	6.8%	7.8%	7.0%								1.8%
	Valid		12.2	.3	9.1	31	3.1%	.2%	5.1%								.3%
	Hewlett-Packard		11.6	9.6	.0	1,097	2.9%	6.5%	.0%								11.1%
	COMPASS Design Automation-VLSI		9.7	.3	8.0	19	2.5%	.2%	4.5%								.2%
	Silvar-Llaco		7.6	.0	4.2	0	1.9%	.0%	2.3%								.0%
	Digital		6.8	4.9	.0	255	1.7%	3.3%	.0%								2.6%
	Fujitsu		4.9	4.4	.0	114	1.2%	3.0%	.0%								1.2%
	NEC		4.6	2.6	1.7	239	1.2%	1.7%	.9%								2.4%
	Cascade Design Automation		4.4	.0	3.0	0	1.1%	.0%	1.7%								.0%
	Sagantec		4.0	.0	3.6	0	1.0%	.0%	2.0%								.0%
	Solbourne		2.5	2.5	.0	511	.6%	1.7%	.0%								5.2%
	Integrated Silicon Systems		2.5	.3	2.1	10	.6%	.2%	1.2%								.1%
	LSI Logic		1.7	.2	1.3	4	.4%	.1%	.7%								.0%
	Sony		1.6	1.4	.0	94	.4%	1.0%	.0%								.9%
	Emerald Design Systems		1.5	.7	.6	24	.4%	.5%	.4%								.2%
	Ontos		1.3	.0	1.3	0	.3%	.0%	.7%								.0%
	National Semiconductor		.4	.1	.3	3	.1%	.1%	.2%								.0%
	Object Design		.3	.0	.3	0	.1%	.0%	.2%								.0%
	Objectivity		.3	.0	.3	0	.1%	.0%	.2%								.0%
	Everex Systems		.1	.1	.0	15	.0%	.1%	.0%								.2%
	Dolphin Integration		.0	.0	.0	0	.0%	.0%	.0%								.0%

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Table 52 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	394.1	148.4	179.7	9,906	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	352.0	128.4	161.7	9,279	89.3%	86.5%	90.0%	93.7%
All Asian-Based Companies	38.0	20.0	14.3	627	9.7%	13.5%	8.0%	6.3%
All European-Based Companies	4.0	.0	3.6	0	1.0%	.0%	2.0%	.0%
All Hardware Companies	123.5	106.7	.0	8,570	31.3%	71.9%	.0%	86.5%
All Turnkey & SW Companies	270.6	41.6	179.7	1,336	68.7%	28.1%	100.0%	13.5%

Source: Dataquest (February 1992)

Table 53
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	20.4	14.7	.0	0	43.9%	58.1%	.0%	.0%
Cadence	12.4	.0	9.8	0	26.7%	.0%	78.2%	.0%
Fujitsu	5.1	4.6	.0	86	11.0%	18.2%	.0%	33.6%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	7.2%	5.7%	9.0%	5.1%
COMPASS Design Automation-VLSI	.8	.8	1.2	3	1.8%	3.0%	9.9%	1.1%
LSI Logic	.2	.0	.2	0	.5%	.1%	1.3%	.2%
Other Companies	4.1	3.8	.2	154	8.9%	14.9%	1.5%	60.1%
All Companies	46.3	25.2	12.5	257	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	37.9	19.2	11.4	158	81.8%	76.1%	91.0%	61.3%
All Asian-Based Companies	8.4	6.0	1.1	99	18.2%	23.9%	9.0%	38.7%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	24.3	18.4	.0	154	52.4%	73.0%	.0%	60.1%
All Turnkey & SW Companies	22.1	6.8	12.5	103	47.6%	27.0%	100.0%	39.9%

Source: Dataquest (February 1992)

Table 34
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	11.2	9.3	.0	282	32.1%	39.2%	.0%	46.4%
Digital	9.6	6.9	.0	0	27.5%	29.1%	.0%	.0%
Solbourne	6.5	6.4	.0	264	18.7%	27.2%	.0%	43.3%
Cadence	6.2	.0	6.2	0	17.9%	.0%	100.0%	.0%
Hewlett-Packard	1.3	1.1	.0	63	3.7%	4.4%	.0%	10.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	34.8	23.7	6.2	609	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	34.8	23.7	6.2	609	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	28.5	23.7	.0	609	82.1%	100.0%	.0%	100.0%
All Turnkey & SW Companies	6.2	.0	6.2	0	17.9%	.0%	100.0%	.0%

Source: Dataquest (February 1992)

Table 55
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Personal Computer
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	2.0	1.8	.0	64	42.2%	58.9%	.0%	16.0%
Everex Systems	1.0	1.0	.0	330	22.3%	34.4%	.0%	82.0%
Tanner Research	1.0	.0	.9	0	21.2%	.0%	66.7%	.0%
Integrated Silicon Systems	.6	.2	.4	8	12.6%	6.7%	29.5%	2.0%
National Semiconductor	.1	.0	.1	0	1.1%	.0%	3.9%	.0%
Other Companies	.0	.0	.0	0	.6%	.0%	.0%	.0%
All Companies	4.6	3.0	1.3	402	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.7	1.2	1.3	338	57.8%	41.1%	100.0%	84.0%
All Asian-Based Companies	2.0	1.8	.0	64	42.2%	58.9%	.0%	16.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.0	1.0	.0	330	22.3%	34.4%	.0%	82.0%
All Turnkey & SW Companies	3.6	2.0	1.3	72	77.7%	65.6%	100.0%	18.0%

Source: Dataquest (February 1992)

Table 56
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company	Total				Market Share			
	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	58.3	50.8	.0	3,849	28.9%	55.4%	.0%	64.8%
Cadence	50.0	.0	37.5	0	24.8%	.0%	53.8%	.0%
Mentor Graphics	39.5	11.5	16.6	384	19.5%	12.5%	23.8%	6.5%
Digital	17.7	12.7	.0	123	8.7%	13.9%	.0%	2.1%
Solbourne	7.3	7.2	.0	630	3.6%	7.9%	.0%	10.6%
Hewlett-Packard	5.4	4.5	.0	487	2.7%	4.9%	.0%	8.2%
COMPASS Design Automation-VLSI	4.9	.5	4.3	10	2.4%	.5%	6.2%	.2%
Valid	3.9	.2	2.7	25	1.9%	.2%	3.9%	.4%
Cascade Design Automation	2.6	.0	1.8	0	1.3%	.0%	2.6%	.0%
Silvar-Lisco	2.0	.0	1.1	0	1.0%	.0%	1.6%	.0%
Integrated Silicon Systems	1.8	.3	1.4	10	.9%	.3%	2.1%	.2%
Emerald Design Systems	1.5	.7	.6	24	.7%	.8%	.9%	.4%
Ontos	1.2	.0	1.2	0	.6%	.0%	1.7%	.0%
LSI Logic	1.2	.1	.9	3	.6%	.1%	1.2%	.0%
Everex Systems	1.1	1.0	.0	311	.5%	1.1%	.0%	5.2%
Tanner Research	.8	.0	.7	0	.4%	.0%	1.0%	.0%
National Semiconductor	.4	.1	.3	3	.2%	.1%	.4%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.4%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.3%	.0%

(Continued)

Table 56 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	2.2	2.0	.1	83	1.1%	2.2%	.1%	1.4%
All Companies	202.0	91.6	69.8	5,941	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	202.0	91.6	69.8	5,941	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	91.9	78.3	.0	5,482	45.5%	85.4%	.0%	92.3%
All Turnkey & SW Companies	110.2	13.3	69.8	459	54.5%	14.6%	100.0%	7.7%

Source: Dataquest (February 1992)

Table 57
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	52.5	46.0	.0	3,720	32.1%	68.3%	.0%	71.7%
Cadence	42.5	.0	31.9	0	26.0%	.0%	51.1%	.0%
Mentor Graphics	39.5	11.5	16.6	384	24.1%	17.0%	26.6%	7.4%
Hewlett-Packard	4.9	4.0	.0	461	3.0%	6.0%	.0%	8.9%
COMPASS Design Automation-VLSI	4.5	.1	3.8	9	2.8%	.2%	6.0%	.2%
Valid	3.9	.2	2.7	25	2.4%	.3%	4.4%	.5%
Digital	3.3	2.4	.0	123	2.0%	3.5%	.0%	2.4%
Cascade Design Automation	2.6	.0	1.8	0	1.6%	.0%	2.9%	.0%
Solbourne	2.1	2.0	.0	415	1.3%	3.0%	.0%	8.0%
Silvar-Lisco	2.0	.0	1.1	0	1.2%	.0%	1.7%	.0%
Emerald Design Systems	1.5	.7	.6	24	.9%	1.1%	1.0%	.5%
Integrated Silicon Systems	1.4	.2	1.2	6	.9%	.3%	1.9%	.1%
Ontos	1.2	.0	1.2	0	.7%	.0%	1.9%	.0%
LSI Logic	1.0	.1	.8	3	.6%	.1%	1.2%	.1%
National Semiconductor	.3	.1	.3	3	.2%	.1%	.4%	.1%
Object Design	.3	.0	.3	0	.2%	.0%	.4%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.4%	.0%
Everex Systems	.1	.1	.0	13	.1%	.2%	.0%	.3%

(Continued)

Table 57 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	163.7	67.4	62.4	5,185	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	163.7	67.4	62.4	5,185	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	62.8	54.5	.0	4,732	38.4%	80.9%	.0%	91.3%
All Turnkey & SW Companies	100.9	12.9	62.4	453	61.6%	19.1%	100.0%	8.7%

Source: Dataquest (February 1992)

Table 58
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	9.8	7.0	.0	0	48.9%	74.8%	.0%	.0%
Cadence	7.5	.0	5.6	0	37.6%	.0%	88.2%	.0%
COMPASS Design Automation-VLSI	.4	.4	.6	1	2.0%	3.8%	9.1%	1.5%
LSI Logic	.1	.0	.1	0	.7%	.1%	1.6%	.3%
Other Companies	2.2	2.0	.1	83	10.9%	21.3%	1.1%	98.1%
All Companies	20.0	9.4	6.4	84	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	20.0	9.4	6.4	84	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	11.9	9.0	.0	83	59.5%	96.1%	.0%	98.1%
All Turnkey & SW Companies	8.1	.4	6.4	2	40.5%	3.9%	100.0%	1.9%

Source: Dataquest (February 1992)

Table 59

1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	5.8	4.8	.0	130	35.9%	34.9%	.0%	35.1%
Solbourne	5.3	5.2	.0	214	32.5%	37.8%	.0%	57.8%
Digital	4.6	3.3	.0	0	28.3%	24.0%	.0%	.0%
Hewlett-Packard	.5	.5	.0	26	3.3%	3.3%	.0%	7.1%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	16.3	13.8	.0	370	100.0%	100.0%	.0%	100.0%
All N.A.-Based Companies	16.3	13.8	.0	370	100.0%	100.0%	.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	16.3	13.8	.0	370	100.0%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%

Source: Dataquest (February 1992)

Table 60
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Personal Computer
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Everex Systems	.9	.9	.0	297	44.3%	88.6%	.0%	98.4%
Tanner Research	.8	.0	.7	0	37.1%	.0%	71.9%	.0%
Integrated Silicon Systems	.4	.1	.2	5	16.7%	11.4%	24.0%	1.6%
National Semiconductor	.0	.0	.0	0	1.9%	.0%	4.2%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2.1	1.1	1.0	302	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	2.1	1.1	1.0	302	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.9	.9	.0	297	44.3%	88.6%	.0%	98.4%
All Turnkey & SW Companies	1.2	.1	1.0	5	55.7%	11.4%	100.0%	1.6%

Source: Dataquest (February 1992)

Table 61
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	30.7	26.8	.0	1,471	28.9%	53.1%	.0%	60.2%
Cadence	19.7	.0	14.8	0	18.5%	.0%	43.2%	.0%
Mentor Graphics	18.4	5.3	7.8	179	17.3%	10.6%	22.6%	7.3%
Digital	14.7	10.6	.0	102	13.8%	21.0%	.0%	4.2%
Hewlett-Packard	5.4	4.5	.0	487	5.1%	8.9%	.0%	20.0%
COMPASS Design Automation-VLSI	4.5	.4	4.0	9	4.3%	.9%	11.7%	.4%
Sagantec	4.0	.0	3.6	0	3.8%	.0%	10.5%	.0%
Valid	2.6	.1	1.6	6	2.4%	.2%	4.8%	.2%
Silvar-Lisco	2.1	.0	1.1	0	1.9%	.0%	3.3%	.0%
Solbourne	1.3	1.2	.0	107	1.2%	2.5%	.0%	4.4%
LSI Logic	.5	.1	.4	1	.5%	.1%	1.1%	.0%
Cascade Design Automation	.4	.0	.3	0	.4%	.0%	.9%	.0%
Seiko Instruments—NO OEM	.3	.1	.1	2	.3%	.2%	.4%	.1%
Integrated Silicon Systems	.2	.0	.1	1	.2%	.0%	.4%	.0%
Tanner Research	.2	.0	.1	0	.1%	.0%	.4%	.0%
Everex Systems	.1	.1	.0	28	.1%	.2%	.0%	1.1%
National Semiconductor	.1	.0	.1	1	.1%	.0%	.2%	.0%
Ontos	.1	.0	.1	0	.1%	.0%	.2%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.1%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.1%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 61 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	1.3	1.2	.1	48	1.2%	2.4%	.1%	2.0%
All Companies	106.5	50.4	34.2	2,441	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	102.1	50.3	30.5	2,440	96.0%	99.8%	89.0%	99.9%
All Asian-Based Companies	.3	.1	.1	2	.3%	.2%	.4%	.1%
All European-Based Companies	4.0	.0	3.6	0	3.8%	.0%	10.6%	.0%
All Hardware Companies	53.4	44.4	.0	2,243	50.1%	88.0%	.0%	91.9%
All Turnkey & SW Companies	53.1	6.1	34.2	199	49.9%	12.0%	100.0%	8.1%

Source: Dataquest (February 1992)

Table 62
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	27.7	24.2	.0	1,403	32.5%	66.8%	.0%	62.8%
Mentor Graphics	18.4	5.3	7.8	179	21.7%	14.7%	24.8%	8.0%
Cadence	16.8	.0	12.6	0	19.7%	.0%	40.2%	.0%
Hewlett-Packard	4.9	4.0	.0	461	5.7%	11.1%	.0%	20.6%
COMPASS Design Automation-VLSI	4.2	.1	3.5	8	4.9%	.3%	11.1%	.4%
Sagantec	4.0	.0	3.6	0	4.7%	.0%	11.5%	.0%
Digital	2.7	2.0	.0	102	3.2%	5.4%	.0%	4.6%
Valid	2.6	.1	1.6	6	3.0%	.2%	5.3%	.3%
Silvar-Lisco	2.1	.0	1.1	0	2.4%	.0%	3.7%	.0%
Cascade Design Automation	.4	.0	.3	0	.5%	.0%	1.0%	.0%
LSI Logic	.4	.0	.3	1	.5%	.1%	1.0%	.0%
Solbourne	.4	.3	.0	70	.4%	.9%	.0%	3.2%
Seiko Instruments—NO OEM	.3	.1	.1	2	.3%	.3%	.4%	.1%
Integrated Silicon Systems	.1	.0	.1	0	.2%	.0%	.3%	.0%
National Semiconductor	.1	.0	.1	1	.1%	.1%	.2%	.0%
Ontos	.1	.0	.1	0	.1%	.0%	.2%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.1%	.0%
Dolphin Integration	.0	.0	.0	0	.0%	.0%	.1%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.1%	.0%
Everex Systems	.0	.0	.0	1	.0%	.0%	.0%	.1%

(Continued)

Table 62 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	85.1	36.3	31.2	2,235	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	80.8	36.2	27.5	2,233	95.0%	99.7%	88.0%	99.9%
All Asian-Based Companies	.3	.1	.1	2	.3%	.3%	.4%	.1%
All European-Based Companies	4.0	.0	3.6	0	4.7%	.0%	11.6%	.0%
All Hardware Companies	35.6	30.6	.0	2,038	41.9%	84.3%	.0%	91.2%
All Turnkey & SW Companies	49.5	5.7	31.2	197	58.1%	15.7%	100.0%	8.8%

Source: Dataquest (February 1992)

Table 63
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Host-Dependent
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	8.1	5.9	.0	0	63.5%	79.3%	.0%	.0%
Cadence	3.0	.0	2.2	0	23.1%	.0%	77.9%	.0%
COMPASS Design Automation-VLSI	.4	.3	.5	1	2.7%	4.3%	18.6%	2.3%
LSI Logic	.1	.0	.0	0	.4%	.1%	1.4%	.2%
Seiko Instruments—NO OEM	.0	.0	.0	0	.2%	.1%	.4%	.2%
Other Companies	1.3	1.2	.0	48	10.0%	16.1%	1.8%	97.2%
All Companies	12.8	7.4	2.9	50	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	12.8	7.4	2.8	50	99.8%	99.9%	99.6%	99.8%
All Asian-Based Companies	.0	.0	.0	0	.2%	.1%	.4%	.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	9.4	7.1	.0	48	73.1%	95.4%	.0%	97.2%
All Turnkey & SW Companies	3.4	.3	2.9	1	26.9%	4.6%	100.0%	2.8%

Source: Dataquest (February 1992)

Table 64
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Server
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	3.8	2.8	.0	0	45.9%	41.5%	.0%	.0%
Sun	3.1	2.6	.0	67	36.8%	38.3%	.0%	51.8%
Solbourne	.9	.9	.0	36	10.8%	13.5%	.0%	27.9%
Hewlett-Packard	.5	.4	.0	26	6.5%	6.6%	.0%	20.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	8.3	6.7	.0	130	100.0%	100.0%	.0%	100.0%
All N.A.-Based Companies	8.3	6.7	.0	130	100.0%	100.0%	.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	8.3	6.7	.0	130	100.0%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%

Source: Dataquest (February 1992)

Table 65

1991 Preliminary CAD/CAM/CAE Market Share:

Application: IC Layout
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Tanner Research	.2	.0	.1	0	55.6%	.0%	81.3%	.0%
Everex Systems	.1	.1	.0	26	29.6%	88.9%	.0%	98.5%
Integrated Silicon Systems	.0	.0	.0	0	11.1%	11.1%	12.5%	1.5%
National Semiconductor	.0	.0	.0	0	3.7%	.0%	6.3%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	.3	.1	.2	27	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	.3	.1	.2	27	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.1	.1	.0	26	29.6%	88.9%	.0%	98.5%
All Turnkey & SW Companies	.2	.0	.2	0	70.4%	11.1%	100.0%	1.5%

Source: Dataquest (February 1992)

Table 66
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	64.1	.0	64.1	0	38.2%	.0%	67.1%	.0%
Seiko Instruments—NO OEM	30.0	12.9	13.7	191	17.9%	23.2%	14.3%	7.3%
Sun	21.8	19.0	.0	1,490	13.0%	34.2%	.0%	56.6%
Mentor Graphics	15.3	4.4	6.4	148	9.1%	8.0%	6.7%	5.6%
Fujitsu	11.9	10.7	.0	265	7.1%	19.3%	.0%	10.1%
Valid	5.8	.0	4.7	0	3.4%	.0%	4.9%	.0%
NEC	4.6	2.6	1.7	239	2.8%	4.7%	1.7%	9.1%
Silvar-Lisco	3.6	.0	2.0	0	2.1%	.0%	2.1%	.0%
Digital	3.3	2.4	.0	23	2.0%	4.2%	.0%	.9%
Hewlett-Packard	1.7	1.4	.0	151	1.0%	2.5%	.0%	5.7%
Sony	1.6	1.4	.0	94	1.0%	2.5%	.0%	3.6%
Cascade Design Automation	1.3	.0	.9	0	.8%	.0%	1.0%	.0%
Integrated Silicon Systems	1.1	.2	.9	7	.7%	.3%	1.0%	.2%
COMPASS Design Automation-VLSI	1.0	.1	.8	2	.6%	.2%	.9%	.1%
LSI Logic	.2	.0	.1	0	.1%	.0%	.1%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Tanner Research	.1	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	7	.0%	.0%	.0%	.3%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 66 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.5	.4	.0	17	.3%	.7%	.1%	.6%
All Companies	167.9	55.5	95.5	2,633	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	119.7	27.9	80.2	1,844	71.3%	50.2%	84.0%	70.0%
All Asian-Based Companies	48.1	27.6	15.3	789	28.7%	49.8%	16.0%	30.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	28.9	24.6	.0	1,781	17.2%	44.2%	.0%	67.6%
All Turnkey & SW Companies	139.0	31.0	95.5	853	82.8%	55.8%	100.0%	32.4%

Source: Dataquest (February 1992)

Table 67
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Technical Workstation
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	55.9	.0	55.9	0	39.0%	.0%	65.1%	.0%
Seiko Instruments—NO OEM	26.7	11.5	12.5	178	18.6%	26.5%	14.6%	7.6%
Sun	19.6	17.2	.0	1,407	13.7%	39.7%	.0%	59.8%
Mentor Graphics	15.3	4.4	6.4	148	10.7%	10.2%	7.5%	6.3%
Valid	5.8	.0	4.7	0	4.0%	.0%	5.5%	.0%
Fujitsu	4.9	4.4	.0	114	3.4%	10.1%	.0%	4.9%
NEC	4.6	2.6	1.7	239	3.2%	6.0%	1.9%	10.2%
Silvar-Lisco	3.6	.0	2.0	0	2.5%	.0%	2.3%	.0%
Sony	1.6	1.4	.0	94	1.1%	3.3%	.0%	4.0%
Hewlett-Packard	1.5	1.2	.0	143	1.1%	2.9%	.0%	6.1%
Cascade Design Automation	1.3	.0	.9	0	.9%	.0%	1.1%	.0%
Integrated Silicon Systems	.9	.1	.8	4	.6%	.3%	.9%	.2%
COMPASS Design Automation-VLSI	.9	.0	.7	2	.6%	.1%	.8%	.1%
Digital	.6	.4	.0	23	.4%	1.0%	.0%	1.0%
LSI Logic	.2	.0	.1	0	.1%	.0%	.2%	.0%
Object Design	.1	.0	.1	0	.0%	.0%	.1%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 67 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	143.4	43.3	85.9	2,353	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	105.7	23.5	71.7	1,727	73.7%	54.2%	83.5%	73.4%
All Asian-Based Companies	37.8	19.9	14.2	626	26.3%	45.8%	16.5%	26.6%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	23.4	20.3	.0	1,667	16.3%	46.8%	.0%	70.8%
All Turnkey & SW Companies	120.1	23.1	85.9	686	83.7%	53.2%	100.0%	29.2%

Source: Dataquest (February 1992)

Table 68
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	5.1	4.6	.0	86	40.0%	59.0%	.0%	74.2%
Seiko Instruments—NO OEM	3.3	1.4	1.1	13	25.9%	18.2%	34.8%	11.2%
Cadence	1.9	.0	1.9	0	15.1%	.0%	59.9%	.0%
Digital	1.8	1.3	.0	0	14.4%	16.7%	.0%	.0%
COMPASS Design Automation-VLSI	.1	.1	.1	0	.6%	.9%	3.4%	.2%
LSI Logic	.0	.0	.0	0	.2%	.0%	.3%	.0%
Other Companies	.5	.4	.1	17	3.8%	5.3%	1.6%	14.3%
All Companies	12.8	7.8	3.2	116	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4.4	1.8	2.1	17	34.1%	22.8%	65.2%	14.5%
All Asian-Based Companies	8.4	6.0	1.1	99	65.9%	77.2%	34.8%	85.5%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	2.3	1.7	.0	17	17.8%	21.9%	.0%	14.3%
All Turnkey & SW Companies	10.5	6.1	3.2	100	82.2%	78.1%	100.0%	85.7%

Source: Dataquest (February 1992)

Table 69
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Cadence	6.2	.0	6.2	0	66.0%	.0%	100.0%	.0%
Sun	2.2	1.8	.0	83	23.1%	70.7%	.0%	91.0%
Digital	.9	.6	.0	0	9.1%	24.2%	.0%	.0%
Hewlett-Packard	.2	.1	.0	8	1.8%	5.1%	.0%	9.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	9.5	2.6	6.2	91	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	9.5	2.6	6.2	91	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.2	2.6	.0	91	34.0%	100.0%	.0%	100.0%
All Turnkey & SW Companies	6.2	.0	6.2	0	66.0%	.0%	100.0%	.0%

Source: Dataquest (February 1992)

Table 70

1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Fujitsu	2.0	1.8	.0	64	87.8%	95.1%	.0%	87.2%
Integrated Silicon Systems	.2	.1	.1	3	9.0%	3.8%	76.5%	3.8%
Tanner Research	.1	.0	.0	0	2.3%	.0%	23.5%	.0%
Everex Systems	.0	.0	.0	7	.9%	1.1%	.0%	9.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	2.2	1.9	.2	74	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	.3	.1	.2	9	12.2%	4.9%	100.0%	12.8%
All Asian-Based Companies	2.0	1.8	.0	64	87.8%	95.1%	.0%	87.2%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.0	.0	.0	7	.9%	1.1%	.0%	9.0%
All Turnkey & SW Companies	2.2	1.8	.2	67	99.1%	98.9%	100.0%	91.0%

Source: Dataquest (February 1992)

Table 71
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: All Platforms
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.1	.8	.0	8	32.0%	29.7%	.0%	4.8%
Sun	1.1	.9	.0	70	30.8%	35.0%	.0%	44.3%
Solbourne	.4	.4	.0	38	12.7%	16.5%	.0%	24.3%
Hewlett-Packard	.4	.3	.0	35	11.2%	12.0%	.0%	22.0%
COMPASS Design Automation-VLSI	.1	.0	.1	0	3.2%	.4%	45.5%	.1%
LSI Logic	.1	.0	.1	0	2.9%	.4%	31.8%	.2%
Other Companies	.3	.2	.0	7	7.2%	6.0%	22.7%	4.3%
All Companies	3.5	2.7	.2	158	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.5	2.7	.2	158	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	3.2	2.6	.0	158	91.6%	99.2%	.0%	99.7%
All Turnkey & SW Companies	.3	.0	.2	0	8.4%	.8%	100.0%	.3%

Source: Dataquest (February 1992)

Table 72
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
Platform: Technical Workstation
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sun	1.0	.8	.0	68	51.6%	59.6%	.0%	50.5%
Hewlett-Packard	.4	.3	.0	33	18.8%	20.6%	.0%	24.6%
Digital	.2	.2	.0	8	11.3%	10.6%	.0%	5.7%
Solbourne	.1	.1	.0	25	6.5%	8.5%	.0%	18.9%
COMPASS Design Automation-VLSI	.1	.0	.1	0	5.4%	.0%	47.1%	.1%
LSI Logic	.1	.0	.1	0	4.8%	.7%	35.3%	.2%
Other Companies	.0	.0	.0	0	1.6%	.0%	17.6%	.0%
All Companies	1.9	1.4	.2	134	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.9	1.4	.2	134	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.6	1.4	.0	134	88.2%	99.3%	.0%	99.7%
All Turnkey & SW Companies	.2	.0	.2	0	11.8%	.7%	100.0%	.3%

Source: Dataquest (February 1992)

Table 73
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Host-Dependent
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	.6	.4	.0	0	74.4%	72.1%	.0%	.0%
COMPASS Design Automation-VLSI	.0	.0	.0	0	1.2%	1.6%	40.0%	.4%
LSI Logic	.0	.0	.0	0	1.2%	.0%	20.0%	.3%
Other Companies	.2	.2	.0	7	23.2%	26.2%	40.0%	99.3%
All Companies	.8	.6	.1	7	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	.8	.6	.1	7	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.8	.6	.0	7	95.1%	98.4%	.0%	99.3%
All Turnkey & SW Companies	.0	.0	.1	0	4.9%	1.6%	100.0%	.7%

Source: Dataquest (February 1992)

Table 74
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Server
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Solbourne	.3	.3	.0	13	42.1%	50.0%	.0%	75.5%
Digital	.3	.2	.0	0	38.2%	31.3%	.0%	.0%
Sun	.1	.1	.0	2	14.5%	14.1%	.0%	13.7%
Hewlett-Packard	.0	.0	.0	2	5.3%	4.7%	.0%	10.9%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	.8	.6	.0	17	100.0%	100.0%	.0%	100.0%
All N.A.-Based Companies	.8	.6	.0	17	100.0%	100.0%	.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.8	.6	.0	17	100.0%	100.0%	.0%	100.0%
All Turnkey & SW Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%

Source: Dataquest (February 1992)

Table 75
1991 Preliminary CAD/CAM/CAE Market Share

Application: IC Layout
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	100.0%	.0%	.0%	.0%
All Companies	.0	.0	.0	0	100.0%	.0%	.0%	.0%
All N.A.-Based Companies	.0	.0	.0	0	100.0%	.0%	.0%	.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Turnkey & SW Companies	.0	.0	.0	0	100.0%	.0%	.0%	.0%

Source: Dataquest (February 1992)

Table 76
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Worldwide
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	104.7	72.5	2.7	702	10.0%	13.8%	.8%	2.3%
Mentor Graphics	89.4	24.9	37.6	869	8.6%	4.7%	10.9%	2.9%
Sun	83.9	73.1	.0	5,160	8.1%	13.9%	.0%	17.3%
Zuken	83.8	33.5	50.3	489	8.0%	6.4%	14.5%	1.6%
Intergraph	54.7	15.9	17.4	463	5.2%	3.0%	5.0%	1.5%
IBM	53.4	32.4	11.2	2,243	5.1%	6.2%	3.2%	7.5%
Racal-Redac	52.7	1.9	41.2	213	5.1%	.4%	11.9%	.7%
Valid	50.2	1.9	35.7	232	4.8%	.4%	10.3%	.8%
Computervision	38.5	14.0	10.6	392	3.7%	2.7%	3.1%	1.3%
Uchida Yoko	36.8	34.9	1.8	584	3.5%	6.7%	.5%	2.0%
Compaq	35.3	35.3	.0	6,040	3.4%	6.7%	.0%	20.2%
Sharp System Products—NO OEM	31.2	16.2	15.0	186	3.0%	3.1%	4.3%	.6%
Fujitsu	30.6	19.0	8.6	686	2.9%	3.6%	2.5%	2.3%
NEC	27.7	19.5	6.0	1,825	2.7%	3.7%	1.7%	6.1%
Scientific Calc.	27.4	3.2	15.9	106	2.6%	.6%	4.6%	.4%
CADIX	22.6	9.0	11.3	166	2.2%	1.7%	3.3%	.6%
Hewlett-Packard	21.4	17.1	.0	1,926	2.0%	3.3%	.0%	6.4%
Siemens Nixdorf Info systems	15.5	7.4	5.4	211	1.5%	1.4%	1.6%	.7%
Toshiba—NO OEM	14.9	7.4	6.0	135	1.4%	1.4%	1.7%	.5%
LPKF	14.4	4.0	9.0	620	1.4%	.8%	2.6%	2.1%
Hitachi	10.5	5.0	4.4	325	1.0%	1.0%	1.3%	1.1%
CADAM	9.6	4.2	4.6	596	.9%	.8%	1.3%	2.0%
Apple Computer	9.3	8.2	.0	1,940	.9%	1.6%	.0%	6.5%

(Continued)

Table 76 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
PADS Software	7.8	.0	6.6	0	.7%	.0%	1.9%	.0%
BETRONEX	5.5	.5	5.1	86	.5%	.1%	1.5%	.3%
Cadence	4.7	.0	3.9	0	.5%	.0%	1.1%	.0%
HP Cade	4.6	2.5	1.4	20	.4%	.5%	.4%	.1%
Pacific Numerics	4.0	.0	4.0	0	.4%	.0%	1.1%	.0%
Solbourne	3.5	3.4	.0	291	.3%	.6%	.0%	1.0%
Orcad	3.1	.0	3.1	0	.3%	.0%	.9%	.0%
Ziegler	3.0	.0	3.0	0	.3%	.0%	.9%	.0%
Autodesk	2.8	.0	2.8	0	.3%	.0%	.8%	.0%
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.2%	.2%	.3%	.0%
Accel Technologies	2.2	.0	1.9	0	.2%	.0%	.6%	.0%
CAD-UL	2.1	.0	2.1	0	.2%	.0%	.6%	.0%
Dell Computer	1.9	1.9	.0	488	.2%	.4%	.0%	1.6%
Sumitomo Denko Workstation	1.8	1.8	.0	100	.2%	.3%	.0%	.3%
Massteck	1.8	.0	1.8	0	.2%	.0%	.5%	.0%
Visionics	1.8	.0	1.3	7	.2%	.0%	.4%	.0%
Infinite Graphics	1.7	.0	1.7	0	.2%	.0%	.5%	.0%
Schlumberger	1.6	.5	.6	17	.2%	.1%	.2%	.1%
Sony	1.6	1.4	.0	92	.2%	.3%	.0%	.3%
Everex Systems	1.5	1.6	.0	460	.1%	.3%	.0%	1.5%
Cooper & Chyan Technology	1.5	.0	1.5	0	.1%	.0%	.4%	.0%
Century Research Center	1.5	.8	.5	8	.1%	.1%	.2%	.0%
DECAD	1.3	.2	.8	5	.1%	.0%	.2%	.0%

(Continued)

Table 76 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Ontos	1.3	.0	1.3	0	.1%	.0%	.4%	.0%
Research Machines	1.2	1.2	.0	194	.1%	.2%	.0%	.6%
Royal Digital Systems	1.0	.0	.9	0	.1%	.0%	.2%	.0%
Cadisy	1.0	.0	1.0	0	.1%	.0%	.3%	.0%
Number One Systems	.8	.1	.7	19	.1%	.0%	.2%	.1%
Sophia Systems	.7	.2	.5	7	.1%	.0%	.1%	.0%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.1%
ALS Design	.7	.0	.6	13	.1%	.0%	.2%	.0%
Selko Instruments—NO OEM	.6	.3	.3	4	.1%	.1%	.1%	.0%
Omaton	.5	.0	.5	0	.0%	.0%	.1%	.0%
Vamp	.4	.0	.4	0	.0%	.0%	.1%	.0%
Andor	.4	.1	.2	3	.0%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.1%	.0%
Kontron Instruments	.2	.1	.1	4	.0%	.0%	.0%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.0%	.0%	.1%	.0%
Foresight Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.0%	.0%	.1%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.0%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.1%
Kubota Computer	.1	.1	.0	10	.0%	.0%	.0%	.0%

(Continued)

Table 76 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Masta Corporation	.1	.0	.0	1	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	48.7	46.4	.0	1,914	4.7%	8.8%	.0%	6.4%
All Companies	1,042.0	524.7	346.3	29,898	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	671.8	356.2	170.4	23,848	64.5%	67.9%	49.2%	79.8%
All Asian-Based Companies	267.1	150.1	106.0	4,629	25.6%	28.6%	30.6%	15.5%
All European-Based Companies	103.1	18.4	69.8	1,421	9.9%	3.5%	20.2%	4.8%
All Hardware Companies	318.9	270.9	.0	21,123	30.6%	51.6%	.0%	70.6%
All Turnkey & SW Companies	723.1	253.8	346.3	8,775	69.4%	48.4%	100.0%	29.4%

Source: Dataquest (February 1992)

Table 77
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	89.4	24.9	37.6	869	13.2%	8.7%	13.9%	6.8%
Zuken	83.8	33.5	50.3	489	12.3%	11.7%	18.6%	3.8%
Sun	75.6	66.2	.0	4,948	11.1%	23.0%	.0%	38.8%
Valid	50.2	1.9	35.7	232	7.4%	.7%	13.2%	1.8%
Racal-Redac	48.6	1.9	37.3	213	7.1%	.7%	13.8%	1.7%
Intergraph	47.6	12.5	16.0	395	7.0%	4.3%	5.9%	3.1%
Computervision	38.5	14.0	10.6	392	5.7%	4.9%	3.9%	3.1%
Uchida Yoko	36.8	34.9	1.8	584	5.4%	12.2%	.7%	4.6%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	4.0%	4.9%	4.8%	1.3%
Scientific Calc.	25.1	2.7	14.1	92	3.7%	.9%	5.2%	.7%
CADIX	22.6	9.0	11.3	166	3.3%	3.1%	4.2%	1.3%
Digital	21.4	13.2	2.0	702	3.2%	4.6%	.7%	5.5%
Hewlett-Packard	17.6	14.1	.0	1,472	2.6%	4.9%	.0%	11.5%
Siemens Nixdorf Info systems	15.5	7.4	5.4	211	2.3%	2.6%	2.0%	1.7%
Toshiba—NO OEM	14.9	7.4	6.0	135	2.2%	2.6%	2.2%	1.1%
NEC	13.9	7.8	5.0	718	2.0%	2.7%	1.8%	5.6%
Fujitsu	12.8	7.9	3.6	301	1.9%	2.8%	1.3%	2.4%
Hitachi	5.3	2.5	2.2	109	.8%	.9%	.8%	.9%
HP Cade	4.6	2.5	1.4	20	.7%	.9%	.5%	.2%
Cadence	4.2	.0	3.6	0	.6%	.0%	1.3%	.0%
Pacific Numerics	3.8	.0	3.8	0	.6%	.0%	1.4%	.0%
IBM	2.8	1.5	.6	87	.4%	.5%	.2%	.7%

(Continued)

Table 77 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.4%	.3%	.4%	.1%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.2%	.6%	.0%	.7%
Sony	1.6	1.4	.0	92	.2%	.5%	.0%	.7%
Cooper & Chyan Technology	1.5	.0	1.5	0	.2%	.0%	.5%	.0%
Century Research Center	1.5	.8	.5	8	.2%	.3%	.2%	.1%
Ontos	1.3	.0	1.3	0	.2%	.0%	.5%	.0%
DECAD	1.3	.2	.8	4	.2%	.1%	.3%	.0%
Schlumberger	1.2	.3	.4	11	.2%	.1%	.2%	.1%
Royal Digital Systems	1.0	.0	.9	0	.1%	.0%	.3%	.0%
Solbourne	.9	.9	.0	189	.1%	.3%	.0%	1.5%
ICL	.7	.4	.2	19	.1%	.1%	.1%	.1%
Seiko Instruments—NO OEM	.6	.3	.3	4	.1%	.1%	.1%	.0%
Sophia Systems	.6	.1	.4	4	.1%	.0%	.1%	.0%
Infinite Graphics	.3	.0	.3	0	.1%	.0%	.1%	.0%
Object Design	.3	.0	.3	0	.0%	.0%	.1%	.0%
Objectivity	.3	.0	.3	0	.0%	.0%	.1%	.0%
Autodesk	.3	.0	.3	0	.0%	.0%	.1%	.0%
Shared Resources	.2	.0	.2	0	.0%	.0%	.1%	.0%
Everex Systems	.2	.2	.0	20	.0%	.1%	.0%	.2%
ALS Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	7	.0%	.0%	.0%	.1%

(Continued)

Table 77 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.1	.0	0	.0%	.0%	.0%	.0%
All Companies	679.6	287.1	270.1	12,761	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	383.6	152.3	129.4	9,410	56.4%	53.0%	47.9%	73.7%
All Asian-Based Companies	225.4	122.3	95.6	2,884	33.2%	42.6%	35.4%	22.6%
All European-Based Companies	70.6	12.5	45.1	467	10.4%	4.3%	16.7%	3.7%
All Hardware Companies	114.6	95.8	.0	7,424	16.9%	33.4%	.0%	58.2%
All Turnkey & SW Companies	565.0	191.3	270.1	5,337	83.1%	66.6%	100.0%	41.8%

Source: Dataquest (February 1992)

Table 78
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	56.6	40.3	.5	0	33.4%	33.2%	2.7%	.0%
IBM	42.8	24.0	10.3	654	25.2%	19.8%	55.8%	22.8%
Fujitsu	12.7	7.9	3.6	214	7.5%	6.5%	19.3%	7.5%
Intergraph	3.4	1.7	.5	32	2.0%	1.4%	2.9%	1.1%
Scientific Calc.	2.4	.5	1.9	14	1.4%	.4%	10.1%	.5%
Hitachi	1.7	.8	.7	30	1.0%	.7%	3.9%	1.0%
CADAM	.6	.0	.5	0	.3%	.0%	2.7%	.0%
Cadence	.5	.0	.3	0	.3%	.0%	1.8%	.0%
Schlumberger	.3	.1	.1	5	.2%	.1%	.6%	.2%
DECAD	.0	.0	.0	1	.0%	.0%	.1%	.0%
Kubota Computer	.0	.0	.0	3	.0%	.0%	.1%	.1%
Other Companies	48.7	46.3	.0	1,914	28.7%	38.1%	.0%	66.8%
All Companies	169.6	121.6	18.4	2,866	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	155.2	112.9	14.1	2,618	91.5%	92.8%	76.7%	91.3%
All Asian-Based Companies	14.4	8.7	4.3	247	8.5%	7.1%	23.3%	8.6%
All European-Based Companies	.0	.0	.0	1	.0%	.0%	.1%	.0%
All Hardware Companies	104.7	86.6	.0	1,914	61.7%	71.2%	.0%	66.8%
All Turnkey & SW Companies	64.9	35.0	18.4	952	38.3%	28.8%	100.0%	33.2%

Source: Dataquest (February 1992)

Table 79
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	26.4	19.0	.0	0	54.5%	54.7%	.0%	.0%
Sun	8.4	6.9	.0	212	17.3%	20.0%	.0%	42.7%
Sharp System Products—NO OEM	4.1	2.1	1.9	18	8.4%	6.0%	61.6%	3.6%
Intergraph	3.6	1.8	.9	37	7.5%	5.1%	27.0%	7.4%
Solbourne	2.5	2.5	.0	102	5.2%	7.2%	.0%	20.6%
Hewlett-Packard	1.6	1.3	.0	79	3.3%	3.8%	.0%	15.8%
IBM	1.5	.9	.3	37	3.1%	2.6%	9.5%	7.4%
Schlumberger	.2	.1	.1	2	.3%	.1%	1.9%	.3%
Sumitomo Denko Workstation	.1	.1	.0	11	.3%	.4%	.0%	2.1%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	48.4	34.7	3.2	496	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	44.2	32.5	1.2	468	91.3%	93.5%	38.4%	94.2%
All Asian-Based Companies	4.2	2.2	1.9	29	8.7%	6.5%	61.6%	5.8%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	39.0	29.9	.0	422	80.6%	86.0%	.0%	85.2%
All Turnkey & SW Companies	9.4	4.9	3.2	74	19.4%	14.0%	100.0%	14.8%

Source: Dataquest (February 1992)

Table 80
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	35.3	35.3	.0	6,040	24.5%	43.4%	.0%	43.8%
LPKF	14.4	4.0	9.0	620	10.0%	4.9%	16.5%	4.5%
NEC	13.9	11.8	1.0	1,107	9.6%	14.5%	1.8%	8.0%
Apple Computer	9.3	8.2	.0	1,940	6.4%	10.0%	.0%	14.1%
CADAM	9.0	4.2	4.1	596	6.2%	5.1%	7.5%	4.3%
PADS Software	7.8	.0	6.6	0	5.4%	.0%	12.1%	.0%
IBM	6.3	5.9	.0	1,466	4.4%	7.3%	.0%	10.6%
BETRONEX	5.5	.5	5.1	86	3.8%	.6%	9.2%	.6%
Fujitsu	5.2	3.2	1.5	170	3.6%	3.9%	2.7%	1.2%
Racal-Redac	4.1	.0	3.9	0	2.9%	.0%	7.2%	.0%
Hitachi	3.6	1.7	1.5	186	2.5%	2.1%	2.7%	1.3%
Orcad	3.1	.0	3.1	0	2.1%	.0%	5.7%	.0%
Ziegler	3.0	.0	3.0	0	2.1%	.0%	5.5%	.0%
Autodesk	2.5	.0	2.5	0	1.8%	.0%	4.6%	.0%
Hewlett-Packard	2.2	1.7	.0	375	1.5%	2.1%	.0%	2.7%
Accel Technologies	2.2	.0	1.9	0	1.5%	.0%	3.5%	.0%
CAD-UL	2.1	.0	2.1	0	1.4%	.0%	3.8%	.0%
Dell Computer	1.9	1.9	.0	488	1.3%	2.3%	.0%	3.5%
Massteck	1.8	.0	1.8	0	1.2%	.0%	3.3%	.0%
Visionics	1.8	.0	1.3	7	1.2%	.0%	2.4%	.1%

(Continued)

Table 80 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Everex Systems	1.4	1.4	.0	440	1.0%	1.7%	.0%	3.2%
Infinite Graphics	1.3	.0	1.3	0	.9%	.0%	2.5%	.0%
Research Machines	1.2	1.2	.0	194	.8%	1.5%	.0%	1.4%
Cadisy	1.0	.0	1.0	0	.7%	.0%	1.7%	.0%
Number One Systems	.8	.1	.7	19	.5%	.1%	1.3%	.1%
ALS Design	.6	.0	.6	13	.4%	.0%	1.0%	.1%
Omaton	.5	.0	.5	0	.3%	.0%	.9%	.0%
Vamp	.4	.0	.4	0	.3%	.0%	.8%	.0%
Andor	.4	.1	.2	3	.2%	.1%	.4%	.0%
Digital	.3	.0	.2	0	.2%	.0%	.4%	.0%
Kontron Instruments	.2	.1	.1	4	.2%	.1%	.2%	.0%
Foresight Resources	.2	.0	.2	0	.2%	.0%	.4%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.2%	.0%	.4%	.0%
Instrumatic Espanola	.2	.0	.2	0	.2%	.0%	.4%	.0%
Pacific Numerics	.2	.0	.2	0	.1%	.0%	.3%	.0%
American Small Business Comp.	.2	.0	.2	0	.1%	.0%	.3%	.0%
Sophia Systems	.1	.0	.1	3	.1%	.0%	.2%	.0%
Innovative Data Design	.1	.0	.1	0	.1%	.0%	.2%	.0%
Olivetti	.1	.1	.0	17	.1%	.1%	.0%	.1%
Masta Corporation	.1	.0	.0	1	.0%	.0%	.1%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.1%	.0%

(Continued)

Table 80 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Worldwide
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	144.3	81.3	54.7	13,775	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	88.8	58.6	25.7	11,353	61.6%	72.0%	47.0%	82.4%
All Asian-Based Companies	23.1	16.8	4.3	1,469	16.0%	20.7%	7.8%	10.7%
All European-Based Companies	32.4	5.9	24.7	953	22.5%	7.3%	45.2%	6.9%
All Hardware Companies	60.6	58.6	.0	11,363	42.0%	72.1%	.0%	82.5%
All Turnkey & SW Companies	83.8	22.7	54.7	2,413	58.0%	27.9%	100.0%	17.5%

Source: Dataquest (February 1992)

Table 81
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	51.4	35.0	2.2	337	15.7%	20.5%	2.3%	2.9%
Sun	43.7	38.1	.0	2,887	13.4%	22.4%	.0%	24.6%
Mentor Graphics	41.0	11.9	17.2	398	12.5%	7.0%	18.3%	3.4%
Valid	31.7	1.6	22.5	209	9.7%	.9%	23.9%	1.8%
Intergraph	24.6	9.4	7.0	225	7.5%	5.5%	7.5%	1.9%
Compaq	15.2	15.2	.0	2,597	4.6%	8.9%	.0%	22.1%
IBM	13.7	8.4	2.8	643	4.2%	4.9%	3.0%	5.5%
Hewlett-Packard	8.6	7.1	.0	771	2.6%	4.2%	.0%	6.6%
Scientific Calc.	8.5	1.2	4.9	34	2.6%	.7%	5.2%	.3%
Computervision	8.0	2.2	2.0	91	2.4%	1.3%	2.1%	.8%
Racal-Redac	6.7	.3	5.5	28	2.0%	.2%	5.8%	.2%
Apple Computer	5.7	5.1	.0	1,203	1.8%	3.0%	.0%	10.2%
Zuken	4.2	1.7	2.5	24	1.3%	1.0%	2.7%	.2%
PADS Software	3.7	.0	3.2	0	1.1%	.0%	3.4%	.0%
Pacific Numerics	3.6	.0	3.6	0	1.1%	.0%	3.8%	.0%
CADAM	2.9	1.3	1.4	178	.9%	.7%	1.5%	1.5%
Solbourne	2.8	2.8	.0	237	.9%	1.6%	.0%	2.0%
Autodesk	2.4	.0	2.4	0	.7%	.0%	2.6%	.0%
Cadence	2.4	.0	1.8	0	.7%	.0%	1.9%	.0%
LPKF	1.8	1.2	.5	75	.6%	.7%	.5%	.6%
Accel Technologies	1.8	.0	1.6	0	.5%	.0%	1.7%	.0%

(Continued)

Table 81 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Visionics	1.8	.0	1.3	7	.5%	.0%	1.4%	.1%
Infinite Graphics	1.7	.0	1.7	0	.5%	.0%	1.8%	.0%
Cooper & Chyan Technology	1.5	.0	1.5	0	.4%	.0%	1.6%	.0%
Everex Systems	1.4	1.4	.0	414	.4%	.8%	.0%	3.5%
Dell Computer	1.3	1.3	.0	327	.4%	.7%	.0%	2.8%
Massteck	1.2	.0	1.2	0	.4%	.0%	1.3%	.0%
Onton	1.2	.0	1.2	0	.4%	.0%	1.3%	.0%
BETRONEX	1.2	.1	1.0	22	.4%	.1%	1.1%	.2%
Orcad	1.1	.0	1.1	0	.3%	.0%	1.1%	.0%
Cadisys	1.0	.0	1.0	0	.3%	.0%	1.0%	.0%
Royal Digital Systems	.8	.0	.7	0	.3%	.0%	.8%	.0%
Schlumberger	.8	.3	.3	8	.2%	.2%	.3%	.1%
Vamp	.4	.0	.4	0	.1%	.0%	.4%	.0%
Omaton	.3	.0	.3	0	.1%	.0%	.3%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.3%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.3%	.0%
The Great Softwestern Co.	.2	.0	.2	0	.1%	.0%	.2%	.0%
Shared Resources	.2	.0	.2	0	.1%	.0%	.2%	.0%
ForeSight Resources	.2	.0	.2	0	.1%	.0%	.2%	.0%
American Small Business Comp.	.2	.0	.2	0	.0%	.0%	.2%	.0%
Innovative Data Design	.1	.0	.1	0	.0%	.0%	.1%	.0%

(Continued)

Table 81 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	26.3	25.1	.0	1,034	8.0%	14.7%	.0%	8.8%
All Companies	327.6	170.4	94.1	11,750	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	313.7	167.1	84.6	11,601	95.8%	98.1%	89.9%	98.7%
All Asian-Based Companies	4.2	1.7	2.5	24	1.3%	1.0%	2.7%	.2%
All European-Based Companies	9.7	1.6	7.0	125	3.0%	1.0%	7.4%	1.1%
All Hardware Companies	156.7	133.9	.0	10,434	47.8%	78.6%	.0%	88.8%
All Turnkey & SW Companies	170.8	36.5	94.1	1,316	52.2%	21.4%	100.0%	11.2%

Source: Dataquest (February 1992)

Table 82

1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Mentor Graphics	41.0	11.9	17.2	398	21.8%	16.0%	24.4%	8.1%
Sun	39.4	34.5	.0	2,790	20.9%	46.4%	.0%	56.9%
Valid	31.7	1.6	22.5	209	16.8%	2.1%	31.9%	4.3%
Intergraph	20.4	7.3	6.2	185	10.8%	9.8%	8.8%	3.8%
Digital	11.1	6.5	1.6	337	5.9%	8.7%	2.3%	6.9%
Computervision	8.0	2.2	2.0	91	4.2%	2.9%	2.9%	1.9%
Scientific Calc.	7.2	.9	3.9	27	3.8%	1.3%	5.5%	.5%
Hewlett-Packard	7.2	5.9	.0	610	3.8%	8.0%	.0%	12.5%
Racal-Redac	5.8	.3	4.6	28	3.1%	.4%	6.6%	.6%
Zuken	4.2	1.7	2.5	24	2.2%	2.3%	3.6%	.5%
Pacific Numerics	3.4	.0	3.4	0	1.8%	.0%	4.8%	.0%
Cadence	2.0	.0	1.5	0	1.1%	.0%	2.2%	.0%
Cooper & Chyan Technology	1.5	.0	1.5	0	.8%	.0%	2.1%	.0%
Ontos	1.2	.0	1.2	0	.6%	.0%	1.7%	.0%
Royal Digital Systems	.8	.0	.7	0	.4%	.0%	1.0%	.0%
Solbourne	.8	.8	.0	154	.4%	1.0%	.0%	3.1%
IBM	.7	.4	.2	24	.4%	.6%	.2%	.5%
Schlumberger	.6	.2	.2	5	.3%	.3%	.3%	.1%
Infinite Graphics	.3	.0	.3	0	.2%	.0%	.5%	.0%
Object Design	.3	.0	.3	0	.1%	.0%	.4%	.0%
Objectivity	.2	.0	.2	0	.1%	.0%	.3%	.0%
Autodesk	.2	.0	.2	0	.1%	.0%	.3%	.0%
Shared Resources	.2	.0	.2	0	.1%	.0%	.3%	.0%
Everex Systems	.2	.2	.0	18	.1%	.2%	.0%	.4%

(Continued)

Table 82 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.1	.0	0	.0%	.1%	.0%	.0%
All Companies	188.3	74.4	70.5	4,899	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	178.3	72.4	63.4	4,847	94.7%	97.3%	89.9%	98.9%
All Asian-Based Companies	4.2	1.7	2.5	24	2.2%	2.3%	3.6%	.5%
All European-Based Companies	5.8	.3	4.6	28	3.1%	.4%	6.6%	.6%
All Hardware Companies	56.5	47.8	.0	3,909	30.0%	64.3%	.0%	79.8%
All Turnkey & SW Companies	131.8	26.5	70.5	990	70.0%	35.7%	100.0%	20.2%

Source: Dataquest (February 1992)

Table 83
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: Host-Dependent
Region: North America
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	27.4	19.3	.4	0	40.0%	37.4%	8.2%	.0%
IBM	10.7	6.0	2.6	169	15.7%	11.6%	54.1%	13.7%
Intergraph	2.0	1.0	.3	19	3.0%	2.0%	6.7%	1.5%
Scientific Calc.	1.3	.3	1.0	7	1.9%	.5%	20.8%	.6%
Cadence	.4	.0	.3	0	.5%	.0%	5.7%	.0%
CADAM	.2	.0	.2	0	.2%	.0%	3.2%	.0%
Schlumberger	.1	.0	.1	2	.2%	.1%	1.3%	.2%
Other Companies	26.3	25.0	.0	1,034	38.5%	48.4%	.0%	84.0%
All Companies	68.4	51.7	4.8	1,231	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	68.4	51.7	4.8	1,231	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	53.2	44.3	.0	1,034	77.8%	85.8%	.0%	84.0%
All Turnkey & SW Companies	15.2	7.3	4.8	197	22.2%	14.2%	100.0%	16.0%

Source: Dataquest (February 1992)

Table 84
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	12.7	9.1	.0	0	56.5%	54.7%	.0%	.0%
Sun	4.4	3.6	.0	97	19.5%	21.7%	.0%	39.4%
Intergraph	2.2	1.1	.5	22	9.7%	6.5%	82.5%	9.0%
Solbourne	2.1	2.0	.0	83	9.2%	12.1%	.0%	33.6%
Hewlett-Packard	.7	.6	.0	33	3.0%	3.4%	.0%	13.3%
IBM	.4	.3	.1	11	1.7%	1.5%	12.7%	4.3%
Schlumberger	.1	.0	.0	1	.4%	.2%	4.8%	.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	22.4	16.7	.6	247	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	22.4	16.7	.6	247	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	19.8	15.3	.0	223	88.4%	92.1%	.0%	90.0%
All Turnkey & SW Companies	2.6	1.3	.6	25	11.6%	7.9%	100.0%	10.0%

Source: Dataquest (February 1992)

Table 85
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped	Total Factory Revenue	Hardware		Software		Hardware Units Shipped
	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue			Revenue	Revenue	Revenue	Revenue	
Compaq	15.2	15.2	15.2	.0	2,597	31.3%	54.8%	.0%	48.3%						
Apple Computer	5.7	5.1	5.1	.0	1,203	11.8%	18.2%	.0%	22.4%						
PADS Software	3.7	.0	.0	3.2	0	7.7%	.0%	17.5%	.0%						
CADAM	2.7	1.3	1.3	1.2	178	5.6%	4.5%	6.8%	3.3%						
Autodesk	2.2	.0	.0	2.2	0	4.6%	.0%	12.1%	.0%						
IBM	1.9	1.8	1.8	.0	440	3.9%	6.4%	.0%	8.2%						
LPKF	1.8	1.2	1.2	.5	75	3.8%	4.3%	2.5%	1.4%						
Visionics	1.8	.0	.0	1.3	7	3.7%	.0%	7.3%	.1%						
Accel Technologies	1.8	.0	.0	1.6	0	3.7%	.0%	8.8%	.0%						
Infinite Graphics	1.3	.0	.0	1.3	0	2.8%	.0%	7.4%	.0%						
Dell Computer	1.3	1.3	1.3	.0	327	2.6%	4.6%	.0%	6.1%						
Everex Systems	1.2	1.3	1.3	.0	396	2.6%	4.5%	.0%	7.4%						
Massteck	1.2	.0	.0	1.2	0	2.6%	.0%	6.8%	.0%						
BETRONEX	1.2	.1	.1	1.0	22	2.4%	.4%	5.7%	.4%						
Orcad	1.1	.0	.0	1.1	0	2.2%	.0%	5.9%	.0%						
Cadisys	1.0	.0	.0	1.0	0	2.0%	.0%	5.2%	.0%						
Racal-Redac	.9	.0	.0	.8	0	1.8%	.0%	4.6%	.0%						
Hewlett-Packard	.7	.6	.6	.0	128	1.5%	2.1%	.0%	2.4%						
Vamp	.4	.0	.0	.4	0	.8%	.0%	2.3%	.0%						
Ormaton	.3	.0	.0	.3	0	.7%	.0%	1.8%	.0%						
The Great Softwestern Co.	.2	.0	.0	.2	0	.5%	.0%	1.3%	.0%						
Digital	.2	.0	.0	.2	0	.5%	.0%	.9%	.0%						
Pacific Numerics	.2	.0	.0	.2	0	.4%	.0%	1.0%	.0%						
Foresight Resources	.2	.0	.0	.2	0	.4%	.0%	.8%	.0%						

(Continued)

Table 85 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: North America
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
American Small Business Comp.	.2	.0	.2	0	.3%	.0%	.8%	.0%
Innovative Data Design	.1	.0	.1	0	.2%	.0%	.6%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	48.5	27.7	18.2	5,373	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	44.7	26.4	15.9	5,276	92.1%	95.3%	87.2%	98.2%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	3.9	1.3	2.3	97	7.9%	4.7%	12.8%	1.8%
All Hardware Companies	27.3	26.4	.0	5,269	56.3%	95.2%	.0%	98.1%
All Turnkey & SW Companies	21.2	1.3	18.2	104	43.7%	4.8%	100.0%	1.9%

Source: Dataquest (February 1992)

Table 86
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share					Hardware Units Shipped	Hardware Revenue	Software Revenue	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
	Revenue	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Factory Revenue	Hardware Revenue							
Digital	40.5	28.7	.0	20.4%	.0%	281	13.4%	20.4%	.0%	3.0%					
Mentor Graphics	26.5	6.6	11.1	4.7%	11.7%	257	8.7%	4.7%	11.7%	2.7%					
Racal-Redac	25.0	.8	20.4	.6%	21.4%	101	8.3%	.6%	21.4%	1.1%					
Computervision	25.0	9.6	6.0	6.8%	6.3%	236	8.2%	6.8%	6.3%	2.5%					
Sun	23.0	20.1	.0	14.2%	.0%	1,103	7.6%	14.2%	.0%	11.8%					
Intergraph	22.0	4.1	7.7	2.9%	8.1%	171	7.2%	2.9%	8.1%	1.8%					
IBM	20.5	12.5	4.3	8.8%	4.5%	870	6.8%	8.8%	4.5%	9.3%					
Compaq	17.3	17.3	.0	12.3%	.0%	2,960	5.7%	12.3%	.0%	31.6%					
Siemens Nixdorf Info systems	14.8	7.1	5.2	5.0%	5.4%	203	4.9%	5.0%	5.4%	2.2%					
LPKF	12.0	2.4	8.4	1.7%	8.8%	520	4.0%	1.7%	8.8%	5.5%					
Scientific Calc.	11.6	.9	6.8	.6%	7.1%	43	3.8%	.6%	7.1%	.5%					
Valid	10.6	.4	6.7	.2%	7.0%	23	3.5%	.2%	7.0%	.2%					
Hewlett-Packard	9.1	7.0	.0	4.9%	.0%	819	3.0%	4.9%	.0%	8.7%					
HP Cade	4.6	2.5	1.4	1.8%	1.4%	20	1.5%	1.8%	1.4%	.2%					
Ziegler	3.0	.0	3.0	.0%	3.2%	0	1.0%	.0%	3.2%	.0%					
BETRONEX	3.0	.2	2.8	.1%	2.9%	39	1.0%	.1%	2.9%	.4%					
Apple Computer	2.4	2.1	.0	1.5%	.0%	504	.8%	1.5%	.0%	5.4%					
CAD-IUL	2.1	.0	2.1	.0%	2.2%	0	.7%	.0%	2.2%	.0%					
CADAM	1.9	.8	.9	.6%	1.0%	120	.6%	.6%	1.0%	1.3%					
PADS Software	1.8	.0	1.5	.0%	1.6%	0	.6%	.0%	1.6%	.0%					
Orcad	1.5	.0	1.5	.0%	1.6%	0	.5%	.0%	1.6%	.0%					
DECAD	1.3	.2	.8	.2%	.8%	5	.4%	.2%	.8%	.1%					
Research Machines	1.2	1.2	.0	.9%	.0%	194	.4%	.9%	.0%	2.1%					

(Continued)

Table 86 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Schlumberger	.9	.2	.3	9	.3%	.1%	.3%	.1%
Zuken	.8	.3	.5	5	.3%	.2%	.5%	.1%
Number One Systems	.8	.1	.7	19	.3%	.0%	.7%	.2%
Cadence	.7	.0	.5	0	.2%	.0%	.5%	.0%
ICL	.7	.4	.2	19	.2%	.3%	.2%	.2%
ALS Design	.7	.0	.6	13	.2%	.0%	.7%	.1%
Dell Computer	.6	.6	.0	161	.2%	.4%	.0%	1.7%
Solbourne	.5	.4	.0	40	.2%	.3%	.0%	.4%
Massteck	.4	.0	.4	0	.1%	.0%	.5%	.0%
Pacific Numerics	.4	.0	.4	0	.1%	.0%	.4%	.0%
Accel Technologies	.3	.0	.3	0	.1%	.0%	.3%	.0%
Kontron Instruments	.2	.1	.1	4	.1%	.1%	.1%	.0%
Instrumatic Espanola	.2	.0	.2	0	.1%	.0%	.2%	.0%
Omaton	.2	.0	.2	0	.1%	.0%	.2%	.0%
Everex Systems	.1	.1	.0	37	.0%	.1%	.0%	.4%
Olivetti	.1	.1	.0	17	.0%	.0%	.0%	.2%
Masta Corporation	.1	.0	.0	1	.0%	.0%	.0%	.0%
Ontos	.1	.0	.1	0	.0%	.0%	.1%	.0%
Foresight Resources	.1	.0	.1	0	.0%	.0%	.1%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Robocom	.0	.0	.0	0	.0%	.0%	.0%	.0%
Object Design	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 86 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	14.8	14.0	.0	580	4.9%	9.9%	.0%	6.2%
All Companies	303.2	140.9	95.3	9,372	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	232.5	125.4	48.8	8,214	76.7%	89.0%	51.2%	87.6%
All Asian-Based Companies	.8	.3	.5	5	.3%	.2%	.5%	.1%
All European-Based Companies	69.8	15.1	45.9	1,153	23.0%	10.7%	48.2%	12.3%
All Hardware Companies	111.8	93.7	.0	7,220	36.9%	66.5%	.0%	77.0%
All Turnkey & SW Companies	191.4	47.2	95.3	2,152	63.1%	33.5%	100.0%	23.0%

Source: Dataquest (February 1992)

Table 87
1991 Preliminary CAD/CAM/CAE Market Share

Company	Application: Platform: Region: Units:	PCB/Hybrid/MCM Technical Workstation Europe Millions of U.S. Dollars/Actual Units	Market Share									
			Total		Hardware		Software		Factory		Hardware	
			Revenue	Revenue	Revenue	Units Shipped	Revenue	Revenue	Revenue	Revenue	Revenue	Revenue
Mentor Graphics			26.5	6.6	11.1	257	15.0%	10.8%	17.2%	8.3%		
Computervision			25.0	9.6	6.0	236	14.2%	15.6%	9.3%	7.7%		
Racal-Redac			21.8	.8	17.3	101	12.3%	1.3%	26.7%	3.3%		
Sun			20.7	18.2	.0	1,053	11.8%	29.5%	.0%	34.2%		
Intergraph			20.1	3.2	7.3	152	11.4%	5.1%	11.3%	4.9%		
Siemens Nixdorf Info. Systems			14.8	7.1	5.2	203	8.4%	11.6%	8.0%	6.6%		
Scientific Calc.			11.6	.9	6.8	43	6.6%	1.5%	10.5%	1.4%		
Valid			10.6	.4	6.7	23	6.0%	.6%	10.4%	.8%		
Digital			7.5	5.0	.0	281	4.3%	8.2%	.0%	9.1%		
Hewlett-Packard			7.5	5.6	.0	620	4.2%	9.1%	.0%	20.1%		
HP Code			4.6	2.5	1.4	20	2.6%	4.1%	2.1%	.6%		
DECAD			1.3	.2	.8	4	.7%	.3%	1.2%	.1%		
IBM			1.1	.5	.2	31	.6%	.9%	.4%	1.0%		
Zuken			.8	.3	.5	5	.5%	.5%	.8%	.2%		
ICL			.7	.4	.2	19	.4%	.7%	.4%	.6%		
Schlumberger			.6	.1	.2	6	.3%	.2%	.3%	.2%		
Cadence			.6	.0	.5	0	.3%	.0%	.7%	.0%		
Pacific Numerics			.4	.0	.4	0	.2%	.0%	.6%	.0%		
Solbourne			.1	.1	.0	26	.1%	.1%	.0%	.8%		
ALS Design			.1	.0	.1	0	.0%	.0%	.1%	.0%		
Ontos			.1	.0	.1	0	.0%	.0%	.1%	.0%		
Objectivity			.0	.0	.0	0	.0%	.0%	.1%	.0%		
Object Design			.0	.0	.0	0	.0%	.0%	.0%	.0%		
Everex Systems			.0	.0	.0	2	.0%	.0%	.0%	.1%		

(Continued)

Table 87 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: Technical Workstation
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	176.3	61.6	64.8	3,081	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	132.3	50.2	39.4	2,730	75.0%	81.5%	60.7%	88.6%
All Asian-Based Companies	.8	.3	.5	5	.5%	.5%	.8%	.2%
All European-Based Companies	43.2	11.0	24.9	346	24.5%	17.9%	38.5%	11.2%
All Hardware Companies	35.9	28.9	.0	1,982	20.3%	47.0%	.0%	64.3%
All Turnkey & SW Companies	140.4	32.6	64.8	1,100	79.7%	53.0%	100.0%	35.7%

Source: Dataquest (February 1992)

Table 88
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	22.4	16.1	.0	0	40.8%	40.5%	.0%	.0%
IBM	16.3	9.2	3.9	239	29.8%	23.1%	91.2%	28.7%
Intergraph	.9	.5	.2	9	1.7%	1.1%	3.5%	1.1%
Schlumberger	.2	.0	.1	2	.3%	.1%	1.2%	.3%
CADAM	.1	.0	.1	0	.2%	.0%	2.3%	.0%
Cadence	.1	.0	.1	0	.2%	.0%	1.6%	.0%
DECAD	.0	.0	.0	1	.1%	.1%	.2%	.1%
Other Companies	14.8	14.0	.0	580	26.9%	35.2%	.0%	69.8%
All Companies	54.8	39.8	4.3	830	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	54.8	39.8	4.3	830	99.9%	99.9%	99.8%	99.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	1	.1%	.1%	.2%	.1%
All Hardware Companies	37.2	30.1	.0	580	67.8%	75.6%	.0%	69.8%
All Turnkey & SW Companies	17.7	9.7	4.3	250	32.2%	24.4%	100.0%	30.2%

Source: Dataquest (February 1992)

Table 89
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	10.6	7.6	.0	0	68.1%	67.3%	.0%	.0%
Sun	2.3	1.9	.0	51	14.8%	16.9%	.0%	41.3%
Intergraph	1.0	.5	.2	10	6.3%	4.4%	62.2%	7.8%
Hewlett-Packard	.7	.6	.0	33	4.2%	5.0%	.0%	26.9%
IBM	.6	.4	.1	14	3.8%	3.1%	29.7%	11.8%
Solbourne	.4	.3	.0	14	2.3%	3.0%	.0%	11.5%
Schlumberger	.1	.0	.0	1	.5%	.2%	8.1%	.7%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	15.5	11.3	.4	122	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	15.5	11.3	.4	122	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	13.9	10.5	.0	110	89.7%	92.7%	.0%	89.5%
All Turnkey & SW Companies	1.6	.8	.4	13	10.3%	7.3%	100.0%	10.5%

Source: Dataquest (February 1992)

Table 90
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Europe
 Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware Units Shipped	Hardware Revenue	Software Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue						
Compaq	17.3	17.3	.0	30.6%	61.3%	.0%	2,960					55.4%
LPKF	12.0	2.4	8.4	21.2%	8.5%	32.6%	520					9.7%
Racal-Redac	3.3	.0	3.1	5.7%	.0%	12.0%	0					.0%
Ziegler	3.0	.0	3.0	5.3%	.0%	11.7%	0					.0%
BETRONEX	3.0	.2	2.8	5.3%	.7%	10.8%	39					.7%
IBM	2.5	2.4	.0	4.5%	8.4%	.0%	586					11.0%
Apple Computer	2.4	2.1	.0	4.3%	7.5%	.0%	504					9.5%
CAD-ILL	2.1	.0	2.1	3.6%	.0%	8.0%	0					.0%
CADAM	1.8	.8	.8	3.2%	3.0%	3.2%	120					2.2%
PADS Software	1.8	.0	1.5	3.2%	.0%	5.9%	0					.0%
Orcad	1.5	.0	1.5	2.6%	.0%	5.8%	0					.0%
Research Machines	1.2	1.2	.0	2.1%	4.3%	.0%	194					3.6%
Hewlett-Packard	1.0	.8	.0	1.7%	2.7%	.0%	165					3.1%
Number One Systems	.8	.1	.7	1.4%	.2%	2.8%	19					.4%
Dell Computer	.6	.6	.0	1.1%	2.2%	.0%	161					3.0%
ALS Design	.6	.0	.6	1.0%	.1%	2.1%	13					.2%
Massteck	.4	.0	.4	.8%	.0%	1.7%	0					.0%
Accel Technologies	.3	.0	.3	.5%	.0%	1.0%	0					.0%
Konttron Instruments	.2	.1	.1	.4%	.4%	.5%	4					.1%
Instrumentatic Espanola	.2	.0	.2	.4%	.0%	.8%	0					.0%
Ormaton	.2	.0	.2	.3%	.0%	.6%	0					.0%
Everex Systems	.1	.1	.0	.2%	.4%	.0%	35					.7%
Olivetti	.1	.1	.0	.2%	.2%	.0%	17					.3%
Masta Corporation	.1	.0	.0	.1%	.0%	.2%	1					.0%

(Continued)

Table 90 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: Personal Computer
Region: Europe
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Foresight Resources	.1	.0	.1	0	.1%	.0%	.2%	.0%
Robocom	.0	.0	.0	0	.1%	.0%	.1%	.0%
Pacific Numerics	.0	.0	.0	0	.0%	.0%	.0%	.0%
American Small Business Comp.	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	56.5	28.2	25.8	5,338	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	30.0	24.1	4.8	4,532	53.0%	85.5%	18.5%	84.9%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	26.6	4.1	21.0	806	47.0%	14.5%	81.5%	15.1%
All Hardware Companies	24.9	24.2	.0	4,549	44.0%	85.8%	.0%	85.2%
All Turnkey & SW Companies	31.7	4.0	25.8	789	56.0%	14.2%	100.0%	14.8%

Source: Dataquest (February 1992)

Table 91
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: All Platforms
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company	Total			Market Share			Hardware Units Shipped	Hardware			Software Revenue	Software			Hardware Units Shipped
	Factory Revenue	Hardware Revenue	Software Revenue	Factory Revenue	Hardware Revenue	Software Revenue		Factory Revenue	Hardware Revenue	Software Revenue		Factory Revenue	Hardware Revenue	Software Revenue	
Zuken	78.3	31.3	47.0	19.8%	15.4%	30.4%	457	19.8%	15.4%	30.4%		19.8%	15.4%	30.4%	5.7%
Uchida Yoko	36.8	34.9	1.8	9.3%	17.2%	1.2%	584	9.3%	17.2%	1.2%		9.3%	17.2%	1.2%	7.2%
Sharp System Products—NO OEM	31.2	16.2	15.0	7.9%	8.0%	9.7%	186	7.9%	8.0%	9.7%		7.9%	8.0%	9.7%	2.3%
Fujitsu	30.6	19.0	8.6	7.7%	9.3%	5.6%	686	7.7%	9.3%	5.6%		7.7%	9.3%	5.6%	8.5%
NEC	27.7	19.5	6.0	7.0%	9.6%	3.9%	1,825	7.0%	9.6%	3.9%		7.0%	9.6%	3.9%	22.6%
CADIX	22.6	9.0	11.3	5.7%	4.4%	7.3%	166	5.7%	4.4%	7.3%		5.7%	4.4%	7.3%	2.1%
Mentor Graphics	22.0	6.4	9.2	5.5%	3.1%	6.0%	213	5.5%	3.1%	6.0%		5.5%	3.1%	6.0%	2.6%
Racal-Redac	21.0	.8	15.3	5.3%	.4%	9.9%	85	5.3%	.4%	9.9%		5.3%	.4%	9.9%	1.0%
IBM	17.5	10.4	3.8	4.4%	5.1%	2.4%	631	4.4%	5.1%	2.4%		4.4%	5.1%	2.4%	7.8%
Sun	16.4	14.3	.0	4.1%	7.0%	.0%	1,117	4.1%	7.0%	.0%		4.1%	7.0%	.0%	13.8%
Toshiba—NO OEM	14.9	7.4	6.0	3.8%	3.7%	3.9%	135	3.8%	3.7%	3.9%		3.8%	3.7%	3.9%	1.7%
Hitachi	10.5	5.0	4.4	2.6%	2.5%	2.9%	325	2.6%	2.5%	2.9%		2.6%	2.5%	2.9%	4.0%
Digital	9.8	6.6	.5	2.5%	3.2%	.3%	63	2.5%	3.2%	.3%		2.5%	3.2%	.3%	.8%
Valid	7.9	.0	6.5	2.0%	.0%	4.2%	0	2.0%	.0%	4.2%		2.0%	.0%	4.2%	.0%
Scientific Calc.	7.4	1.1	4.3	1.9%	.5%	2.8%	30	1.9%	.5%	2.8%		1.9%	.5%	2.8%	.4%
Intergraph	6.4	1.5	2.3	1.6%	.8%	1.5%	48	1.6%	.8%	1.5%		1.6%	.8%	1.5%	.6%
Computervision	5.2	2.1	2.5	1.3%	1.0%	1.6%	61	1.3%	1.0%	1.6%		1.3%	1.0%	1.6%	.7%
CADAM	4.8	2.1	2.3	1.2%	1.0%	1.5%	298	1.2%	1.0%	1.5%		1.2%	1.0%	1.5%	3.7%
Hewlett-Packard	3.2	2.6	.0	.8%	1.3%	.0%	289	.8%	1.3%	.0%		.8%	1.3%	.0%	3.6%
Tokyo Electron—NO OEM	2.5	.8	1.2	.6%	.4%	.8%	9	.6%	.4%	.8%		.6%	.4%	.8%	.1%
PADS Software	2.0	.0	1.7	.5%	.0%	1.1%	0	.5%	.0%	1.1%		.5%	.0%	1.1%	.0%

(Continued)

Table 91 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sumitomo Denko Workstation	1.8	1.8	.0	100	.5%	.9%	.0%	1.2%
Cadence	1.6	.0	1.6	0	.4%	.0%	1.0%	.0%
Sony	1.6	1.4	.0	92	.4%	.7%	.0%	1.1%
Century Research Center	1.5	.8	.5	8	.4%	.4%	.3%	.1%
Compaq	1.1	1.1	.0	181	.3%	.5%	.0%	2.2%
Apple Computer	1.0	.9	.0	213	.3%	.4%	.0%	2.6%
BETRONEX	.9	.1	.8	17	.2%	.0%	.5%	.2%
Sophia Systems	.7	.2	.5	7	.2%	.1%	.3%	.1%
Selko Instruments—NO OEM	.6	.3	.3	4	.2%	.1%	.2%	.1%
LPKF	.5	.3	.1	20	.1%	.2%	.1%	.2%
Siemens Nixdorf Info systems	.5	.2	.2	6	.1%	.1%	.1%	.1%
Andor	.4	.1	.2	3	.1%	.0%	.2%	.0%
Autodesk	.3	.0	.3	0	.1%	.0%	.2%	.0%
Kubota Computer	.1	.1	.0	10	.0%	.0%	.0%	.1%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Massteck	.1	.0	.1	0	.0%	.0%	.0%	.0%
Accel Technologies	.0	.0	.0	0	.0%	.0%	.0%	.0%
Everex Systems	.0	.0	.0	9	.0%	.0%	.0%	.1%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%
Omaton	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 91 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	5.1	4.8	.0	199	1.3%	2.4%	.0%	2.5%
All Companies	396.3	203.2	154.4	8,078	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	111.8	53.8	35.2	3,353	28.2%	26.5%	22.8%	41.5%
All Asian-Based Companies	261.6	147.9	102.8	4,597	66.0%	72.8%	66.5%	56.9%
All European-Based Companies	22.9	1.5	16.4	128	5.8%	.7%	10.6%	1.6%
All Hardware Companies	41.1	35.2	.0	2,836	10.4%	17.3%	.0%	35.1%
All Turnkey & SW Companies	355.2	168.0	154.4	5,243	89.6%	82.7%	100.0%	64.9%

Source: Dataquest (February 1992)

Table 92
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Zuken	78.3	31.3	47.0	457	25.2%	21.1%	35.1%	9.9%
Uchida Yoko	36.8	34.9	1.8	584	11.8%	23.5%	1.4%	12.6%
Sharp System Products—NO OEM	27.1	14.1	13.0	168	8.7%	9.5%	9.7%	3.6%
CADIX	22.6	9.0	11.3	166	7.3%	6.1%	8.4%	3.6%
Mentor Graphics	22.0	6.4	9.2	213	7.1%	4.3%	6.9%	4.6%
Racal-Redac	21.0	.8	15.3	85	6.8%	.6%	11.4%	1.8%
Toshiba—NO OEM	14.9	7.4	6.0	135	4.8%	5.0%	4.4%	2.9%
Sun	14.7	12.9	.0	1,055	4.7%	8.7%	.0%	22.8%
NEC	13.9	7.8	5.0	718	4.5%	5.2%	3.7%	15.5%
Fujitsu	12.8	7.9	3.6	301	4.1%	5.3%	2.7%	6.5%
Valid	7.9	.0	6.5	0	2.5%	.0%	4.8%	.0%
Scientific Calc.	6.3	.8	3.4	23	2.0%	.6%	2.5%	.5%
Intergraph	6.0	1.4	2.3	44	1.9%	.9%	1.7%	1.0%
Hitachi	5.3	2.5	2.2	109	1.7%	1.7%	1.6%	2.4%
Computervision	5.2	2.1	2.5	61	1.7%	1.4%	1.9%	1.3%
Hewlett-Packard	2.5	2.1	.0	199	.8%	1.4%	.0%	4.3%
Tokyo Electron—NO OEM	2.5	.8	1.2	9	.8%	.6%	.9%	.2%
Digital	2.2	1.2	.4	63	.7%	.8%	.3%	1.4%
Sumitomo Denko Workstation	1.7	1.7	.0	90	.5%	1.1%	.0%	1.9%
Cadence	1.6	.0	1.6	0	.5%	.0%	1.2%	.0%
Sony	1.6	1.4	.0	92	.5%	.9%	.0%	2.0%
Century Research Center	1.5	.8	.5	8	.5%	.5%	.4%	.2%
IBM	1.0	.5	.2	29	.3%	.4%	.1%	.6%
Seiko Instruments—NO OEM	.6	.3	.3	4	.2%	.2%	.2%	.1%

(Continued)

Table 92 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sophia Systems	.6	.1	.4	4	.2%	.1%	.3%	.1%
Siemens Nixdorf Info systems	.5	.2	.2	6	.1%	.2%	.1%	.1%
Object Design	.1	.0	.1	0	.0%	.0%	.0%	.0%
Kubota Computer	.0	.0	.0	7	.0%	.0%	.0%	.2%
Autodesk	.0	.0	.0	0	.0%	.0%	.0%	.0%
Objectivity	.0	.0	.0	0	.0%	.0%	.0%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	310.9	148.7	134.0	4,632	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	69.5	27.5	26.2	1,689	22.3%	18.5%	19.5%	36.5%
All Asian-Based Companies	220.0	120.1	92.3	2,852	70.8%	80.8%	68.9%	61.6%
All European-Based Companies	21.5	1.1	15.5	91	6.9%	.7%	11.6%	2.0%
All Hardware Companies	20.5	17.6	.0	1,410	6.6%	11.9%	.0%	30.4%
All Turnkey & SW Companies	290.4	131.0	134.0	3,222	93.4%	88.1%	100.0%	69.6%

Source: Dataquest (February 1992)

Table 93
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: Host-Dependent
Region: Asia
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
IBM	14.5	8.1	3.5	226	35.6%	31.7%	38.5%	33.2%
Fujitsu	12.7	7.9	3.6	214	31.2%	30.7%	39.5%	31.5%
Digital	5.2	3.7	.1	0	12.7%	14.3%	1.1%	.0%
Hitachi	1.7	.8	.7	30	4.1%	3.2%	7.9%	4.4%
Scientific Calc.	1.1	.2	.9	6	2.7%	.9%	9.7%	.9%
CADAM	.3	.0	.2	0	.7%	.0%	2.7%	.0%
Intergraph	.2	.1	.0	2	.5%	.3%	.3%	.3%
Kubota Computer	.0	.0	.0	3	.1%	.1%	.2%	.5%
Other Companies	5.1	4.8	.0	199	12.5%	18.8%	.0%	29.3%
All Companies	40.7	25.6	9.0	681	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	26.3	16.9	4.7	433	64.6%	66.1%	52.3%	63.7%
All Asian-Based Companies	14.4	8.7	4.3	247	35.4%	33.9%	47.7%	36.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	10.1	8.5	.0	199	24.8%	33.1%	.0%	29.3%
All Turnkey & SW Companies	30.6	17.1	9.0	482	75.2%	66.9%	100.0%	70.7%

Source: Dataquest (February 1992)

Table 94
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Server
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Sharp System Products—NO OEM	4.1	2.1	1.9	18	44.4%	36.0%	93.3%	15.9%
Digital	2.4	1.7	.0	0	26.1%	29.5%	.0%	.0%
Sun	1.6	1.4	.0	62	18.0%	23.2%	.0%	54.9%
IBM	.5	.3	.1	10	5.4%	4.6%	4.8%	8.8%
Intergraph	.2	.1	.0	2	2.4%	1.4%	1.9%	1.9%
Hewlett-Packard	.2	.2	.0	10	2.3%	2.9%	.0%	9.1%
Sumitomo Denko Workstation	.1	.1	.0	11	1.5%	2.4%	.0%	9.4%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	9.1	5.8	2.1	113	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	4.9	3.6	.1	84	54.1%	61.6%	6.7%	74.7%
All Asian-Based Companies	4.2	2.2	1.9	29	45.9%	38.4%	93.3%	25.3%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.3	3.3	.0	80	46.5%	55.9%	.0%	70.6%
All Turnkey & SW Companies	4.9	2.6	2.1	33	53.5%	44.1%	100.0%	29.4%

Source: Dataquest (February 1992)

Table 95
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
NEC	13.9	11.8	1.0	1,107	38.9%	50.9%	10.3%	41.7%
Fujitsu	5.2	3.2	1.5	170	14.5%	13.8%	15.4%	6.4%
CADAM	4.5	2.1	2.1	298	12.7%	9.0%	21.9%	11.2%
Hitachi	3.6	1.7	1.5	186	10.0%	7.4%	15.9%	7.0%
PADS Software	2.0	.0	1.7	0	5.7%	.0%	18.3%	.0%
IBM	1.6	1.5	.0	366	4.4%	6.4%	.0%	13.8%
Compaq	1.1	1.1	.0	181	3.0%	4.6%	.0%	6.8%
Apple Computer	1.0	.9	.0	213	2.9%	3.9%	.0%	8.0%
BETRONEX	.9	.1	.8	17	2.6%	.4%	8.8%	.6%
LPKF	.5	.3	.1	20	1.4%	1.4%	1.3%	.8%
Hewlett-Packard	.5	.4	.0	79	1.3%	1.5%	.0%	3.0%
Andor	.4	.1	.2	3	1.0%	.4%	2.6%	.1%
Autodesk	.3	.0	.3	0	.8%	.0%	3.2%	.0%
Sophia Systems	.1	.0	.1	3	.4%	.2%	1.0%	.1%
Digital	.1	.0	.0	0	.2%	.0%	.4%	.0%
Massteck	.1	.0	.1	0	.1%	.0%	.5%	.0%
Accel Technologies	.0	.0	.0	0	.1%	.0%	.3%	.0%
Everex Systems	.0	.0	.0	9	.1%	.1%	.0%	.3%
Omaton	.0	.0	.0	0	.0%	.0%	.1%	.0%
Foresight Resources	.0	.0	.0	0	.0%	.0%	.0%	.0%

(Continued)

Table 95 (Continued)

1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Asia
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	35.6	23.1	9.4	2,653	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	11.1	5.9	4.2	1,147	31.3%	25.5%	44.7%	43.2%
All Asian-Based Companies	23.1	16.8	4.3	1,469	64.8%	72.7%	45.2%	55.4%
All European-Based Companies	1.4	.4	1.0	37	4.0%	1.8%	10.1%	1.4%
All Hardware Companies	6.2	5.9	.0	1,147	17.5%	25.5%	.0%	43.2%
All Turnkey & SW Companies	29.4	17.2	9.4	1,506	82.5%	74.5%	100.0%	56.8%

Source: Dataquest (February 1992)

Table 96

1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	3.0	2.2	.0	21	20.3%	21.4%	.0%	3.0%
Compaq	1.8	1.8	.0	302	11.8%	17.2%	.0%	43.3%
IBM	1.7	1.1	.3	98	11.5%	10.6%	13.7%	14.1%
Intergraph	1.7	.9	.3	18	11.3%	8.7%	13.3%	2.6%
Sun	.8	.7	.0	53	5.4%	6.8%	.0%	7.5%
Orcad	.5	.0	.5	0	3.5%	.0%	21.4%	.0%
Hewlett-Packard	.5	.5	.0	48	3.5%	4.4%	.0%	6.9%
BETRONEX	.5	.1	.4	9	3.1%	.5%	16.5%	1.2%
Zuken	.4	.2	.3	2	2.8%	1.7%	10.1%	.4%
Computervision	.4	.1	.1	4	2.6%	1.0%	4.0%	.6%
PADS Software	.2	.0	.2	0	1.5%	.0%	8.1%	.0%
Solbourne	.2	.2	.0	14	1.2%	1.7%	.0%	2.1%
Siemens Nixdorf Info systems	.2	.1	.1	2	1.0%	.7%	2.0%	.3%
Royal Digital Systems	.1	.0	.1	0	.9%	.0%	4.8%	.0%
LPKF	.1	.1	.0	5	.8%	.7%	1.2%	.7%
Apple Computer	.1	.1	.0	19	.6%	.8%	.0%	2.8%
Massteck	.1	.0	.1	0	.3%	.0%	2.0%	.0%
Accel Technologies	.0	.0	.0	0	.3%	.0%	1.2%	.0%
Autodesk	.0	.0	.0	0	.2%	.0%	1.2%	.0%
Ziegler	.0	.0	.0	0	.1%	.0%	.4%	.0%

(Continued)

Table 96 (Continued)
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: All Platforms
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Other Companies	2.6	2.5	.0	101	17.3%	24.0%	.0%	14.5%
All Companies	14.9	10.3	2.5	698	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	13.8	9.9	1.7	680	92.2%	96.5%	69.8%	97.4%
All Asian-Based Companies	.4	.2	.3	2	2.8%	1.7%	10.1%	.4%
All European-Based Companies	.7	.2	.5	16	5.0%	1.9%	20.2%	2.3%
All Hardware Companies	9.3	8.1	.0	634	62.2%	79.2%	.0%	90.8%
All Turnkey & SW Companies	5.7	2.1	2.5	64	37.8%	20.8%	100.0%	9.2%

Source: Dataquest (February 1992)

Table 97
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Technical Workstation
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Intergraph	1.2	.7	.2	14	28.8%	26.2%	29.9%	9.2%
Sun	.7	.6	.0	51	17.3%	25.0%	.0%	34.1%
Digital	.6	.4	.0	21	13.5%	16.3%	.0%	14.2%
Hewlett-Packard	.5	.4	.0	42	11.1%	15.5%	.0%	28.3%
Zuken	.4	.2	.3	2	10.1%	6.7%	32.5%	1.6%
Computervision	.4	.1	.1	4	9.4%	4.0%	13.0%	3.0%
Siemens Nixdorf Info systems	.2	.1	.1	2	3.6%	2.8%	6.5%	1.4%
Royal Digital Systems	.1	.0	.1	0	3.1%	.0%	15.6%	.0%
IBM	.1	.1	.0	3	1.9%	2.0%	2.6%	1.9%
Solbourne	.1	.0	.0	9	1.2%	1.6%	.0%	6.3%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	4.2	2.5	.8	149	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.6	2.3	.5	144	86.3%	90.5%	61.0%	96.9%
All Asian-Based Companies	.4	.2	.3	2	10.1%	6.7%	32.5%	1.6%
All European-Based Companies	.2	.1	.1	2	3.6%	2.8%	6.5%	1.4%
All Hardware Companies	1.8	1.5	.0	123	43.0%	58.3%	.0%	82.9%
All Turnkey & SW Companies	2.4	1.1	.8	25	57.0%	41.7%	100.0%	17.1%

Source: Dataquest (February 1992)

Table 98
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Host-Dependent
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	1.7	1.2	.0	0	29.1%	26.9%	.0%	.0%
IBM	1.3	.7	.3	20	22.1%	15.8%	88.6%	16.4%
Intergraph	.2	.1	.0	2	4.2%	2.4%	11.4%	1.7%
Other Companies	2.6	2.5	.0	101	44.6%	54.8%	.0%	81.9%
All Companies	5.8	4.5	.4	124	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	5.8	4.5	.4	124	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	4.3	3.7	.0	101	73.7%	81.7%	.0%	81.9%
All Turnkey & SW Companies	1.5	.8	.4	22	26.3%	18.3%	100.0%	18.1%

Source: Dataquest (February 1992)

Table 99
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
Platform: Server
Region: Rest of World
Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Digital	.8	.6	.0	0	58.5%	59.4%	.0%	.0%
Intergraph	.3	.1	.1	3	18.5%	12.5%	85.7%	19.2%
Solbourne	.1	.1	.0	5	9.6%	13.5%	.0%	37.5%
Sun	.1	.1	.0	2	5.9%	7.3%	.0%	13.1%
IBM	.1	.0	.0	2	3.7%	3.1%	14.3%	12.7%
Hewlett-Packard	.1	.0	.0	2	3.7%	4.2%	.0%	17.4%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	1.4	1.0	.1	14	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	1.4	1.0	.1	14	100.0%	100.0%	100.0%	100.0%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Hardware Companies	1.1	.8	.0	11	78.5%	85.4%	.0%	79.2%
All Turnkey & SW Companies	.3	.1	.1	3	21.5%	14.6%	100.0%	20.8%

Source: Dataquest (February 1992)

Table 100
1991 Preliminary CAD/CAM/CAE Market Share

Application: PCB/Hybrid/MCM
 Platform: Personal Computer
 Region: Rest of World
 Units: Millions of U.S. Dollars/Actual Units

Company					Market Share			
	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped	Total Factory Revenue	Hardware Revenue	Software Revenue	Hardware Units Shipped
Compaq	1.8	1.8	.0	302	48.2%	77.2%	.0%	73.3%
Orcad	.5	.0	.5	0	14.5%	.0%	41.1%	.0%
BETRONEX	.5	.1	.4	9	12.6%	2.2%	31.8%	2.1%
IBM	.3	.3	.0	73	8.5%	13.2%	.0%	17.8%
PADS Software	.2	.0	.2	0	6.3%	.0%	15.5%	.0%
LPKF	.1	.1	.0	5	3.3%	3.1%	2.3%	1.2%
Apple Computer	.1	.1	.0	19	2.5%	3.5%	.0%	4.7%
Massteck	.1	.0	.1	0	1.4%	.0%	3.9%	.0%
Accel Technologies	.0	.0	.0	0	1.1%	.0%	2.3%	.0%
Autodesk	.0	.0	.0	0	.8%	.0%	2.3%	.0%
Hewlett-Packard	.0	.0	.0	4	.5%	.9%	.0%	.9%
Ziegler	.0	.0	.0	0	.3%	.0%	.8%	.0%
Other Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All Companies	3.7	2.3	1.3	412	100.0%	100.0%	100.0%	100.0%
All N.A.-Based Companies	3.1	2.2	.8	398	83.8%	94.7%	65.1%	96.7%
All Asian-Based Companies	.0	.0	.0	0	.0%	.0%	.0%	.0%
All European-Based Companies	.6	.1	.5	14	16.2%	5.3%	34.9%	3.3%
All Hardware Companies	2.2	2.2	.0	398	59.7%	94.7%	.0%	96.7%
All Turnkey & SW Companies	1.5	.1	1.3	14	40.3%	5.3%	100.0%	3.3%

Source: Dataquest (February 1992)

Dataquest

Dataquest Research and Sales Offices:

Dataquest Incorporated
1290 Ridder Park Drive
San Jose, California 95131-2398
Phone: 01 (408) 437-8000
Telex: 171973
Fax: 01 (408) 437-0292
Technology Products Group
Phone: (800) 624-3280

Dataquest Incorporated
Ledgeway/Dataquest
The Corporate Center
550 Cochituate Road
Framingham, MA 01701
Phone: 01 (508) 370-5555
Fax: 01 (508) 370-6262

Dataquest Incorporated
Invitational Computer Conferences Division
3151 Airway Avenue, C-2
Costa Mesa, California 92626
Phone: 01 (714) 957-0171
Fax: 01 (714) 957-0903

Dataquest Australia
Suite 1, Century Plaza
80 Berry Street
North Sydney, NSW 2060
Australia
Phone: 61 (2) 959-4544
Fax: 61 (2) 929-0635

Dataquest Europe Limited
Roussel House, Broadwater Park
Denham, Uxbridge, Middx UB9 5HP
England
Phone: 44 (895) 835050
Fax: 44 (895) 835260/1

Dataquest Europe SA
Tour Galliéni 2
36, avenue du Général-de-Gaulle
93175 Bagnolet Cedex
France
Phone: 33 (1) 48 97 31 00
Telex: 233 263
Fax: 33 (1) 48 97 34 00

Dataquest GmbH
Kronstadter Strasse 9
8000 Munich 80
Germany
Phone: 49 (89) 93 09 09 0
Fax: 49 (89) 930 3277

Dataquest Germany
In der Schneithohl 17
6242 Kronberg 2
Germany
Phone: 49 6173/61685
Fax: 49 6173/67901

Dataquest Hong Kong
Rm. 401, Connaught Comm. Bldg.
185 Wanchai Rd.
Wanchai, Hong Kong
Phone: (852) 8387336
Fax: (852) 5722375

Dataquest Japan Limited
Shinkawa Sanko Building
1-3-17 Shinkawa, Chuo-ku
Tokyo, 104
Japan
Phone: 81 (3) 5566-0411
Fax: 81 (3) 5566-0425

Dataquest Korea
Daeheung Bldg. 1105
648-23 Yeoksam-dong
Kangnam-gu
Seoul, Korea 135
Phone: 82 (2) 556-4166
Fax: 82 (2) 552-2661

Dataquest Singapore
4012 Ang Mo Kio Industrial Park 1
Ave. 10, #03-10 to #03-12
Singapore 2056
Phone: 65 4597181
Telex: 38257
Fax: 65 4563129

Dataquest Taiwan
Room 801/8th Floor
Ever Spring Building
147, Sec. 2, Chien Kuo N. Rd.
Taipei, Taiwan R.O.C. 104
Phone: 886 (2) 501-7960
886 (2) 501-5592
Fax: 886 (2) 505-4265